Insights for Early Action

Literature review

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Table of Contents

Executive Summary

This document summarises the findings of a review of recent international research on the early identification of, and early intervention with, students at risk of disengagement. It is based on the analysis and synthesis of 40 empirical studies on: predictors of disengagement/school dropout; the use of data to identify students at risk of disengagement; and the efficacy of early interventions to prevent disengagement.

Key Findings

- There is a developing evidence base that can inform schools' and school systems' efforts to identify and intervene with students at risk of disengagement. The current evidence base is better developed in relation to certain topics (e.g. stronger research base on predictors versus data-based identification) and certain locations (e.g. more research in the USA versus Australia).

- There is a well-developed research literature on predictors of school dropout, and it highlights the importance of certain student-level (e.g. educational performance, behaviour, and aspirations) and family-level (e.g. socio-economic status, and educational support) factors. School-level predictors (e.g. school type) are not as influential as student- or family-level predictors.

- There is some evidence to suggest that it is preferable to use predictors that are based on analysis of trends over time (e.g. longitudinal growth modelling) and multiple non-overlapping indicators (e.g. low attendance *or* poor behaviour, rather than low attendance *and* poor behaviour).

- Emerging research and evaluation on the use of data to identify students at risk of disengagement suggests that jurisdictions can usefully develop early warning systems that monitor all students in order to identify and proactively intervene with those who show early signs of attendance, behaviour or academic problems.

- The current evidence also suggests that such systems need to be: focused on specific key indicators but also flexible to local contexts; based on system-level data but also practitioner expertise and judgement; timely for early prevention but also rigorous for accuracy; targeted to those at most risk but also monitoring of all students; practical and easy to use but also building of new capabilities and cultures; and about early identification but also early intervention.

- Investigations into the efficacy of interventions with students at risk of disengagement in the US show that dropout prevention programs (e.g. Check and Connect, Career Academies and mentoring) can successfully reduce dropout and improve attendance, and truancy prevention programs (e.g. Diplomas Now, Early Truancy Prevention Program) can improve attendance but tend to have less marked impacts.

- The evidence to date indicates that dropout prevention programs are more effective when they: include more components (e.g. social, academic and behavioural); are tailored to student's needs; focus on future goals valued by the student; and are delivered in small groups by trained and consistent staff. Truancy prevention programs are less well researched but it seems that programs that are run within (as opposed to outside of) the school show more promise for reducing truancy.

Implications

- The evidence base identified in this review suggests that there is real potential for evidence-informed practice in this area, and efforts should be made to foster stronger connections between research and practice/policy at all levels of Australian jurisdictions. Such efforts, however, need to be mindful of potential limitations with the current evidence and its transferability, and recognise the need for investment in further research on this issue in Australia.

- The well-established research base on predictors of school dropout suggests that efforts to identify students at risk of disengagement within schools and across systems should focus on combinations of student-level (e.g. educational performance and behaviour) and family-level (e.g. socio-economic status) factors early in the educational process. Education jurisdictions should also seek, where possible, to prioritise the use of multiple non-overlapping indicators based on analysis of trends over time.

- Emerging studies on the use of data to identify students at risk of disengagement show that there are international examples that Australian school and system leaders could investigate and draw upon, and early stage evaluation findings that they could consider and use. Such studies also make clear that the development of early warning systems in Australian schools and jurisdictions would need to be carefully designed, effectively implemented and well supported.

- Evidence on the efficacy of dropout prevention programs and truancy prevention programs in the US suggests that the development and implementation of targeted early intervention programs is worth considering in Australia. However, careful thinking about context (i.e. programs that work well in the US may not work well in Australia) and evaluation is necessary. In other words, there are research-informed insights that could provide a starting point for the design, development, implementation and evaluation of early intervention programs in Australian school and school systems.

1   Introduction

This introductory section explains the background to this research, the aims and methods of the literature review, and the structure of the report.

1.1 Background

Student disengagement and dropout from school are major challenges for education jurisdictions internationally. In Australia, analyses show that 26 per cent of young people do not complete a Year 12 certificate or equivalent qualification by age 19 (Lamb et al., 2015), and similar trends are seen across other OECD counties (Lamb and Markussen, 2011; De Witte et al., 2013). In Victoria more specifically, the State Government has set a target of reducing the proportion of student leaving education between Year 9 and Year 12 by 50 per cent over the next 10 years (DET, 2016).

The negative consequences that stem from disengagement and early school leaving are dramatic and sustained. Research internationally has clearly demonstrated that compared to school completers, early school leavers have higher rates of unemployment, lower earnings, poorer health, higher rates of mortality, and higher rates of criminal behaviour (Rumberger et al., 2017; Rumberger and Lim, 2008a). The economic and social costs associated with these outcomes are very large. Analysis based on 2014 Australian data, for example, puts the average lifetime economic cost as $344,600 for each early leaver, and the average social cost as $612,200 for each early leaver over the adult years (25-64) (Lamb and Huo, 2017).

Against this backdrop, the Bastow Institute of Educational Leadership (Bastow) initiated a research and development project to understand and improve how schools identify and respond to students at risk of disengagement. Entitled 'Insights for Early Action', this project focused particularly on the use of data in the early identification of students at risk of disengagement. It was undertaken during 2018 by Evidence for Learning (E4L) and Monash University Faculty of Education (Monash) working in partnership with Bastow. The project involved two main processes – a review of international research literature and case studies of 10 Victorian public schools. This document presents the findings of the literature review component of the project.

1.2 Aims

The aim of the literature review was to ascertain what recent international research suggests about:

- the factors that can help to predict risk of disengagement;
- the use of data to identify students at risk of disengagement; and
- the efficacy of early interventions to prevent disengagement.

The underlying aspiration is for the findings of this literature review, coupled with insights from case-study investigations in Victorian schools, to provide the basis for resources and recommendations for Victorian teachers and school leaders around using data to identify and respond to students at risk of disengagement.

Before outlining the processes by which this review was conducted, it is important to articulate the understanding of disengagement that underpinned it. Disengagement is a complex issue that can be defined, conceptualised and measured in different ways. For the purposes of this review, we found it helpful to draw on Hancock and Zubrick's (2015) approach to defining disengagement. Their approach is helpful because it not only frames disengagement in terms of a small number of clear statements but also conveys a strong sense of its breadth and complexity (Figure 1).

They make clear that disengagement:

- can occur at different levels within education – students can be disengaged at different levels such as with the class content, the classroom itself, the school and/or the education system in general;

- can involve different dimensions – students can become disengaged across a range of different domains such as emotional disengagement, behavioural disengagement and/or cognitive disengagement;

- is both a process and an outcome – for example, while poor attendance may reflect disengagement from school, it is also a risk factor for other disengagement indicators such as early school leaving; and

- is shaped by wider influences – contexts beyond the school and educational setting such as family are an integral part of disengagement processes for children and young people.

Figure 1: Domains of Disengagement
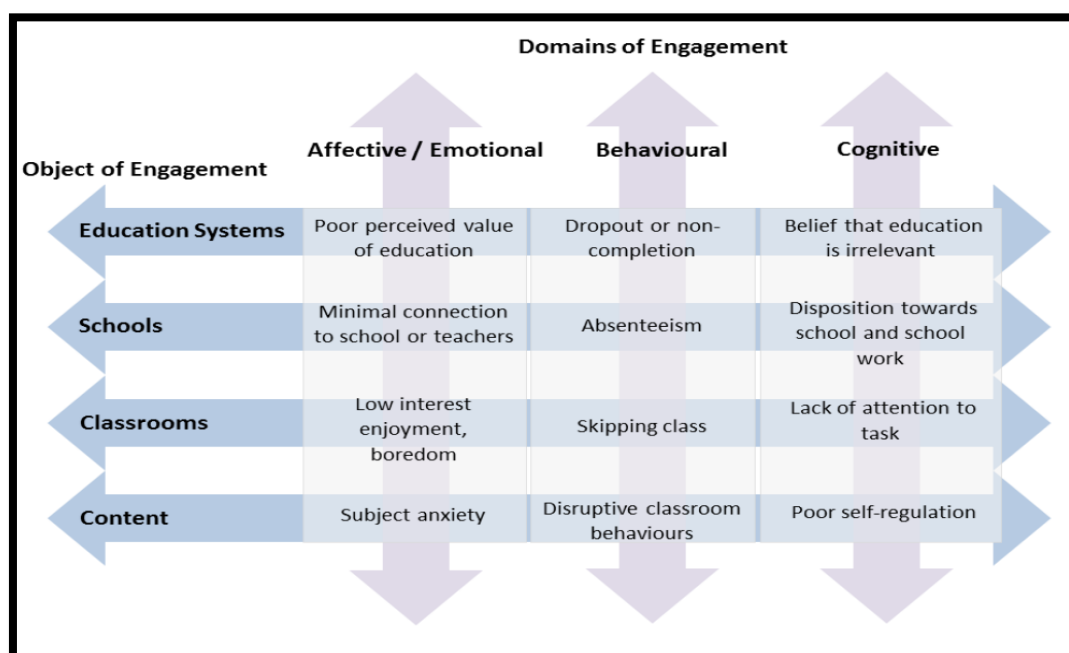
Source: Hancock and Zubrick (2015: 16)

1.3 Methods

Search strategy

The scope of the literature summary was driven by a series of search parameters (Table 1). Based on these parameters, a comprehensive search using different keywords and databases was conducted and was restricted to the last 10 years (2008-2018) and English language. Four databases were searched to find relevant studies:

- Education Resources Information Centre (ERIC);
- A+ Education;
- PsychINFO; and
- Google Scholar.

These sources were chosen due to their relevance to education. A wider search of Google was completed to obtain relevant grey literature. Alerts were established in all databases to ensure relevant

newly published literature was also identified. Forwards and backwards citation screening was also used to identify as many relevant citations as possible.

Table 1: Search Parameters

Overall focus	Empirical studies and research syntheses on the identification of students at-risk of disengagement within schools and, in particular, on predictors of disengagement, the use of data and early interventions.
Time-scale	Work published 2008-2018
Age range	Studies of practices with primary and secondary school-aged students
Geographical scope	Work published in English in Australia, New Zealand, USA, Canada, and the UK
Publication types	Peer-reviewed journal articles, research and evaluation reports, and research-based guidance reports

This excluded:

non-empirical studies;

work published before 2008;

studies of practices in pre-school or post-school institutions; and

work published in other languages/countries to those listed above.

As shown in <u>Appendix 1</u>, the search terms and subject headings used for all databases were wide-ranging and categorised into three groups:

- *Population*: e.g. school, teacher, student;
- *Intervention/topic*: e.g. predictors, use of data, early intervention; and
- *Outcome*: e.g. disengagement, dropout, progress.

Search terms and subject headings were incorporated into the relevant syntax for each database and combined using wildcards (e.g. disengage* was used to detect both 'disengagement' and 'disengaged'). Subject headings (e.g. early intervention) were also used to further ensure the citation yield was relevant to the research question.

1.4 Search results

In total, 5,603 citations were identified using database searching and supplemental methods, which was reduced to 5,585 after removing duplicates. After screening titles and abstracts, 167 studies remained for full text review. The screening and selection criteria (see section Screening and selection) were used to quickly screen articles and, if the inclusion criteria appeared satisfied, the entire article was read in detail to establish eligibility for review inclusion. After screening 167 full texts, 40 satisfied the screening and selection criteria and remained for inclusion in the final review.

Screening and selection

All citations were downloaded to EndNote to remove duplicates and were then uploaded into the Covidence online software system for title and abstract screening. Title and abstract screening, as well as full text screening, was duplicated with a third reviewer present to resolve conflicts. Full texts were considered for inclusion if they were specific to:

Population

   a)   Primary or secondary level schools or teachers.

Topics

a) Predictors of disengagement and dropout;

b) Data use by schools to identify students at risk of disengagement; and/or

c) Efficacy of in-school programs aimed to prevent disengagement of at-risk students.

Study design

a) Empirical experimental and observational studies;

b) Systematic reviews;

c) Guidelines; and

d) Grey literature.

Study location

a) Australia;

b) UK;

c) New Zealand;

d) Canada; or

e) UK.

Published after 2007

Written in English

Data extraction and quality appraisal

All of the publications selected for full text analysis were then sorted into broad substantive categories using the three main literature review foci (i.e. predictors, use of data and early intervention). There was a number of studies that related to more than one of these categories. The publications within each category were then read in full and specific common details were extracted. Extracted data included: author details (e.g. name), publication details (e.g. date published), aim of the study, sample and location, methods, findings and the relevance of these findings to the aims of this review.

Throughout this process, there was ongoing assessment of quality. This involved consideration of: the nature of the publication (e.g. peer reviewed article or grey literature); the nature of the study design (e.g. experimental or quasi-experimental or observational primary study and systematic or narrative research review); the methodological characteristics of the study (e.g. the nature of the sample and sampling processes); and the nature of the research base (e.g. the number and range of studies undertaken on a specific topic). All of these processes were important in becoming clearer about the credibility of the findings of individual studies, the strength of the research base relating to different topics and the nature of the conclusions that could be drawn from different parts of the evidence base.

1.5 Structure of the report

The remainder of this report is structured into four main sections. Section 2 discusses the research evidence on the factors that can help to predict disengagement and school dropout. Section 3 then examines the research evidence on how schools and school systems use data to identify students at risk of disengagement. In Section 4, the focus shifts from identification to intervention with consideration of research on the efficacy of early interventions with students at risk of disengagement. Finally, Section 5 presents a summary of the report's main findings and their implications.

2 Predictors of Disengagement

This section examines the research evidence on the factors that can help to predict disengagement and more specifically school dropout. It provides an overview of the recent research on predictors, followed by discussion of the evidence on: student-related predictors; family and school-related predictors; and the accuracy of different kinds of predictors. It concludes with a short summary of key messages.

2.1 Research on predictors

There is a well-established and long-standing research literature on predictors of school dropout. Over a decade ago, Rumberger and Lim's (2008a:3) review of work in this area referred to 'a vast empirical research literature'. Drawing on this literature, this section focuses on empirical studies and/or research syntheses that have looked specifically at the factors that can help to predict the likelihood of students dropping out from school. These studies/syntheses are all based on statistical analysis of student longitudinal data at a national or state level. They examine the effects of different predictor variables (e.g. student test scores) on the outcome variable of school dropout. The findings are indicative of statistically significant relationships, but not causal links. The relevant studies/syntheses include work undertaken in different locations over varying time-scales and age ranges, but mostly during the middle or high school, rather than primary/elementary school, years (see Appendix 2 for full details).

Broadly speaking, the evidence considered in this section can be divided into three main groups:

- **empirical studies of dropout predictors in North America** – This group includes nine studies, which were all conducted in the US (e.g. Robison et al., 2017) apart from one that was undertaken in Canada (Fortin et al. 2013). Three of the studies examined national-scale datasets (e.g. Parr and Bonitz, 2015), while the other six analysed state-level (e.g. Franklin & Trouard, 2016) or district-level (e.g. Lovelace et al, 2018) data. Most of the studies were focused on the predictive power of data collected in the middle school years (e.g. Henry et al., 2012), but there were some that looked at elementary school data (e.g. Barry & Reschly, 2012).

- **empirical studies on predictors of school dropout in Australia** – This group includes four different Australian studies. They are based on analysis of either state-level (e.g. Marks, 2014) or national-level (e.g. Homel et al 2012) data. Data are derived from data-sets such as the Longitudinal Survey of Australian Youth (e.g. Polidano et al., 2013), the Youth in Focus survey (e.g. Homel et al, 2012) and the Programme for International Student Assessment (e.g. Marks, 2014). Reflecting the data-sets analysed, these studies focus mainly on trends between Year 9 and the end of secondary school in Year 12.

- **reviews/syntheses of dropout research/predictors internationally** – This group includes three reviews: a systematic synthesis of the findings of 203 empirical studies in the US over 25 years (Rumberger & Lim, 2008a); a critical analysis of international research on early school leaving (De Witte et al., 2013); and a comparative statistical analysis of the accuracy of 110 dropout indicators derived from 36 US/Canadian studies (Bowers et al., 2013).

Drawing on these three bodies of work, this section presents a synthesis of the key messages that emerge from their various findings.

2.2 Student-related predictors

There is considerable research evidence on student-related factors that are influential upon future school dropout. It is a well-established and complex research literature, but it is possible to draw out three main messages:

- educational performance is a strong predictor of dropout;
- student behaviour is another strong predictor of dropout; and

- demographic factors and attitudinal factors are also important.

Educational performance is a strong predictor of dropout

One recurring finding across many studies is that students' educational performance is a powerful predictor of future school dropout. This link between academic performance and dropout is not a new phenomenon. Rumberger and Lim's (2008a:19) synthesis of 203 published research studies on school dropout, for example, noted that:

> Of the 389 analyses in our review, more than 200 of them included at least one measure of academic achievement. A majority of the studies found that academic achievement had a statistically significant effect on the likelihood of dropping out or graduating from high school. […] The results also show that academic performance in both middle and elementary school can often predict whether students will drop out or graduate in high school.

Similarly, in a more recent review of the same literature, De Witte et al. (2013: 18) observed that: 'Whether measured by exam success, grade point average, test scores or literacy and numeracy skills level, most scholars have found that early academic achievement in elementary and secondary school is predictive of early school leaving'.

Both of these reviews also highlight the importance of another dimension of educational performance that is predictive of dropout – namely, grade retention (students being retained in a grade level due to not achieving sufficient credits). Rumberger and Lim (2008a:22) reported that 'retention is a consistent predictor of whether students graduate. Thirty-seven of the 50 analyses [on this topic] found that retention in elementary and/or middle school increased the odds of dropping out of high school'. Meanwhile, De Witte et al. (2013: 18) pointed out that 'many studies suggest that being past the typical age in a grade significantly increases the hazard of leaving school early'.

The above arguments are strongly supported by the findings of more recent studies in varied locations. Fortin et al.'s (2013: 575) longitudinal study of data from 672 students in Quebec, Canada between the ages of 12/13 years and 19/20 years, for example, found that: 'poor academic achievement was the only latent factor to directly and significantly predict dropout (0.71, p<0.000)'. Academic achievement was measured in terms of grade point averages in French, Mathematics, and English, and the findings were very clear: 'Results of this study indicate that poor academic achievement is indeed a strong predictor of dropping out of school' (ibid.:577).

Similarly, a US study of a national sample of 15,753 high school students over two years (from Grade 10 to Grade 12) found that: 'With respect to the performance-dropout link, high performance in both English and mathematics resulted in a lower likelihood of dropping out of high school two years later' (Parr and Bonitz, 2015: 512).

In the Australian context, Marks' (2014) study of the student and school influences on reaching Year 12 in the state of Victoria. Based on analyses of the Year 9 NAPLAN and Year 12 VCE data from the 70,000 students who were in Year 9 in 2008, this study found that 'the strongest predictor of school completion is prior student performance (in this case, Year 9 NAPLAN performance in reading and numeracy)'.

This aligns with another Australian study which examined the factors contributing to the gap in school completion that exists between low and high socio-economic status (SES) students (Polidano et al., 2013). Based on analysis of PISA[1] and LSAY[2] data for 12,500 15-year old students, this study found that one of the two most important contributing factors was 'lower numeracy and reading test scores at age 15' (ibid.: 230). So the lower academic achievement of low-SES students accounted for '7 of the 19 percentage point gap [in high school completion] between low and high SES' (ibid.: 243). And, as the

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[1] Programme of International Student Assessment
[2] Longitudinal Survey of Australian Youth

authors elaborate, 'This result is consistent with previous multivariate studies that have shown test scores during middle school to be an important predictor of completion' (ibid.: 343).

Both of the above studies concur with an earlier Australian study that examined the impact of different dimensions of socio-economic disadvantage on Year 12 completion (Homel et al., 2012). This study analysed data from two national datasets (the LSAY and the YIF[3] survey) for 3975 and 1746 young people respectively who were born in 1987-88 and completed Year 12 in 2006. It reported clear findings about the impact of student achievement and grade retention:

> Reading and mathematical literacy in absolute terms are strongly and positively associated with Year 12 completion. The probability of Year 12 completion increases by seven percentage points with an additional 100 scores on each of reading and mathematical literacy tests. (ibid.: 30)

> Those who had repeated a school grade had a lower probability of school completion of around 30 percentage points in the YIF sample and 22 percentage points in the LSAY sample. (ibid.: 40)

Other studies that report similar themes include: Bowers et al. (2013), Lamb et al. (2015), Franklin and Trouard (2016), Robison et al. (2017), Wood et al (2017), and Orpinas et al (2018).

Student behaviour is another strong predictor of dropout

Another group of important predictors of dropout are ones related to student behaviour. The significance of behavioural factors has been clear in the research literature for several years. As Rumberger and Lim (2008b: 2) noted a decade ago: 'A wide range of behaviours both in and out of school has been shown to predict dropout and graduation'. In particular, the following behavioural factors have been shown to be significantly associated with dropout: high absenteeism; misbehaviour in high school and delinquent behaviour outside of high school; drug or alcohol use during high school; teenage parenting and childbearing increase the odds of dropping out; and having friends who engage in criminal behaviour or friends who have dropped out (Rumberger and Lim, 2008a).

More recent studies have provided further evidence on the importance of behavioural predictors. Robison et al.'s (2017: 44) analysis of longitudinal educational and juvenile justice data for 596,537 students in urban Louisiana between 1996 and 2012, for example, reported that: 'Negative and antisocial behaviour, and/or the associated responses to these behaviours (measured via juvenile justice involvement and school expulsion), are the most consistent predictors of negative school outcomes'. Their analyses showed that: 'Being expelled gives an otherwise 'average' student an 8% chance of dropping out of school, and a mere 28% chance of graduating on time (versus 4% and 57%, respectively, for those who are not expelled)' (and similar effects were seen for students who had encountered the juvenile justice system) (ibid.: 44).

An earlier Australian study reported similar findings. Homel et al. (2012), in their investigation into the impact of different dimensions of socio-economic disadvantage on Year 12 completion, highlighted the negative impact of suspension and risky behaviours:

> There is a strong negative association between secondary school suspension histories and the probability of Year 12 completion. Those who were ever suspended from school were 19 percentage points less likely to have completed school. (ibid.: 31)

> Risky behaviours, including experiences of smoking and alcohol consumption, have a statistically significant negative effect on school completion. Experience of smoking reduces the probability of Year 12 completion by eight percentage points, while drinking alcohol does so by seven percentage points. (ibid.: 32)

In relation to school attendance, Parr and Bonitz's (2015: 512) analysis of data for 15,753 US high school students between Grade 10 to Grade 12 found that, in line with previous research, 'students with

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[3] Youth in Focus survey

high absenteeism had a higher likelihood of dropping out'. Similar findings have been reported by other studies in the US (e.g. Franklin and Trouard, 2016) and Australia (e.g. The Smith Family, 2018). Also the most recent 2017 national guidance on dropout prevention in the US places a 'stronger focus on attendance' because 'recent evidence indicates it is especially important for dropout prevention' (Rumberger et al., 2017: 6).

Another study that has highlighted behavioural predictors is Orpinas et al.'s (2018) longitudinal examination of the trajectories of 620 students from middle school (6th grade) to high school (12th grade) in Georgia, USA. Based on analysis of nationally-normed annual teacher ratings of the students' aggression and study skills over the six years, the research team found that: 'Students in the group with the highest dropout rate exhibited a mix of academic and behavioural risk factors as early as sixth grade. The dropout rate for the highest risk group (High Desisting Aggression and Low Study Skills) was 28 times higher than the lowest risk group (Low Aggression and High Study Skills)' (ibid.: 250).

In general, it would seem that the research evidence on behaviour and dropout has tended to focus on the influence of measurable negative behaviours such as school absenteeism, school expulsion or juvenile justice involvement. Less seems to be known about the influence (or otherwise) of less overt patterns of behaviour such as students being present but socially withdrawn. That said, as noted in Rumberger and Lim's (2008a:41-2) review, there are some studies that have highlighted the influence of adolescent mental health:

> Six studies examined the relationship between adolescent mental health and dropout. Five of the studies found that adolescents who reported symptoms of depression (feeling depressed, lonely, sad, etc.) were more likely to dropout, even after controlling for a number of other factors, including academic performance and family background.

There is also some recognition within the literature of the importance of less obvious forms of negative behaviour. A recent investigation into the predictive power of data from student engagement surveys with 10,067 ninth grade students in a south-eastern US school district, for example, argued that: 'Years of research on dropout indicates that disengagement from school, such as disciplinary problems or low attendance rates, are powerful predictors of dropping out. However, disengagement in elementary or middle school years might start with less severe forms of withdrawal.' (Lovelace et al., 2018: 81). The authors reported that: 'Data on cognitive and affective engagement may be more challenging to gather than behavioral engagement indicators, but this study found distinct, additive value when incorporated into a multifactor model [of high school dropout]' (ibid.: 82).

Demographic factors and attitudinal factors are also important

Alongside educational performance and behaviour, there is also research evidence around the influence of certain demographic predictors and attitudinal predictors.

In terms of demographic predictors, Rumberger and Lim (2008a) highlighted the influence of gender and ethnic background. Broadly speaking, they reported that 'dropout rates are higher for males than for females, and they are higher for Blacks, Hispanics, and Native Americans than for Asians and Whites' (ibid.: 37). More recent studies have reported similar patterns. Marks' (2014: 344) investigation into the student and school influences on reaching Year 12 in the Australian state of Victoria established that:

> Boys are substantially less likely to reach Year 12 than girls, and this gender gap cannot be attributed to differences in student performance. Students from non-English-speaking backgrounds are more likely to reach Year 12 other things being equal. Indigenous students are substantially less likely to reach Year 12 even when taking into account socioeconomic background, schools, and prior performance.

Lamb et al.'s (2015) investigation into the proportions and characteristics of young people in Australia who are succeeding or missing out at four key milestones (entry to school, entry to high school, end of high school and early adulthood) paints a similar picture. For example:

> The risk factors most strongly associated with non-completion of Year 12 or its equivalent are being Indigenous, being male, and coming from a low-SES background. While the overall number at risk is over 80,000, males account for 48,924 or 60 per cent of those without Year 12. Indigenous students have low rates of school completion, making up 6,508 of those missing out or 8 per cent of the total national number of non-completers at age 19. (ibid.: 46)

Alongside gender and ethnic background, the research on predictors has also flagged up the influence of disability. Rumberger and Lim (2008a:41), for example, report that:

> Students with disabilities have much higher dropout rates than students without disabilities. For example, data from [one national longitudinal study] show that the dropout rate for students with learning disabilities (LD) was 26 percent and the dropout rate for students with emotional or behavioral disorders (EBD) was 50 percent, while the dropout rate for students without disabilities was 15 percent.

In relation to attitudinal predictors, historically there has tended to be fewer studies exploring the influence or otherwise of student's beliefs, values and attitudes on dropout. One exception has been work looking into students' educational expectations. As Rumberger and Lim (2008b: 2) describe: 'The dropout literature has generally focused on a single indicator— educational expectations (how far in school a student expects to go)—and has found that higher levels of educational expectations are associated with lower dropout rates'.

This is echoed by more recent studies including Polidano et al.'s (2013) investigation into the relative contribution that a range of factors make to the gap in school completion that exists between low and high socio-economic status students in Australia. Based on analysis of PISA and LSAY data for 12,500 15-year old students, this study found that one of the two most important contributing factors was 'lower educational aspirations of low SES students and their parents' (ibid.: 230). As they explained, 'Across all SES backgrounds, student and parent aspirations appear to be important in explaining the chances of completion […] The contribution of this study is in highlighting just how important differences in education aspirations are in explaining the gap in school completion by SES' (ibid.: 238 and 243).

Similarly in the Australian context, Homel et al.'s (2012: 33) investigation into how different dimensions of disadvantage affect Year 12 completion highlighted the significant influence of students' aspirations. Their analysis identified three 'core factors that matter for school completion' and one of these was aspirations. For example, 'Aspirations at age 15 also have a statistically significant effect on Year 12 completion. Plans to participate in Year 12 and to go to university increase the probability of school completion by 24 and eight percentage points respectively' (ibid.: 32). The significance of educational aspirations is further underlined in a related study (Homel and Ryan, 2014: 7) which concluded not only that 'educational aspirations have a substantial effect on educational outcomes' but also that 'aspirations have a similar impact on outcomes across individuals, regardless of their demographic background. That is, interaction effects between aspirations and the demographic characteristics do not seem particularly important.'

2.3 Family and school-related predictors

Research on school dropout predictors has highlighted the role of factors beyond the individual students – namely, the influence of their families and their schools. The evidence in this area can be summarised in terms of two main messages:

- family socio-economic status and educational support are significant predictors; and
- school-level characteristics are generally limited as predictors of dropout.

Family socio-economic status and educational support are significant predictors

Several recent studies have flagged up the role of socio-economic status in predicting dropout. Robison et al.'s (2017: 44) longitudinal analysis of educational and juvenile justice data for 596,537 students in urban Louisiana between 1996 and 2012 is one example. They identified four variables that were most predictive of whether students dropped out of school or not, and one of these was 'poverty/family socio-economic status' measured in terms of 'eligibility for free school lunch'. It is important to stress, though, that socio-economic status came after academic performance ('failing a grade') and student behaviour ('prior school expulsion') in its predictive power. As the authors explained:

> In the dropout model, the greatest disparity between those of different values on a given variable is found on the grade failure indicator (a difference of 5 percentage points between those average students who fail versus those average students who do not fail), followed by the expulsion (a difference of 4 percentage points between those average students who are expelled versus those average students who are not expelled), free lunch and juvenile justice contact measures (a difference of 3 percentage points between coded groups in both instances). (ibid.: 42-3)

In a similar way, Wood et al.'s (2017) analysis of data from a national sample of 14,106 Grade 10 students in the US, identified a number of significant predictors including family socio-economic status. In this study, SES was measured in terms of 'five equally weighted, standardized components including father's/guardian's education, mother's/guardian's education, family income, father's/guardian's occupation, and mother's/guardian's occupation' (ibid.: 40). The findings indicated 'a significant, negative relationship between the expected log-odds of dropping out and composite achievement scores, student SES, and involvement in extracurricular activities' (ibid.: 42). Here again, then, we see socio-economic status as a predictor alongside other factors such as educational performance/engagement.

The importance of SES alongside other variables is also underlined by Australian research. Lamb et al.'s (2015) investigation into the proportions and characteristics of young people in Australia who are succeeding or missing out at four key milestones (entry to school, entry to high school, end of high school and early adulthood) is one example. The analysis of those who did not attain a Year 12 or Certificate III by age 19 nationally in 2014 showed that 'the risk factors most strongly associated with non-completion of Year 12 or its equivalent are being Indigenous, being male, and coming from a low-SES background' (ibid.: 46). In relation to SES specifically, they reported that 'low-SES learners are much more likely to miss out, and those from the lowest decile account for 11,340 (14 per cent) of the 81,199 who do not complete school' (ibid.: 46).

Another relevant study looked into the effectiveness of a number of variables in predicting dropout during high school for two samples of 29,554 Grade 6 students and 31,641 Grade 8 students in Louisiana, USA (Franklin and Trouard, 2016). The researchers found that 'students' age, poverty, gender, attendance level, and test scores were significant predictors of [high school] completion status', and amongst these different predictors 'poverty had the second highest impact' (ibid.: 636). In this study, poverty was defined as 'students eligible for free or reduced-price meals' (ibid.: 634). Finally, one other US study that analysed a national sample of 15,753 high school students over two years (from Grade 10 to Grade 12), found that: 'stable demographic variables, such as SES, were most predictive of dropout status' (Parr and Bonitz, 2015: 512).

Alongside the above research highlighting the socio-economic status of families, there are other studies that have flagged up the importance of parental support and educational aspirations in relation to dropout. Parr and Bonitz's (2015) analysis of 15,753 US high school students between Grade 10 and Grade 12, for example, included 'parental involvement' as one variable. Focused on mathematics and English and based on teacher reports of 'how involved are parents of this student in his/her academic performance', they found that parental involvement was indeed one of four variables that were 'most predictive of high school dropout' (ibid.: 504). Meanwhile, the significance of parental aspirations was

highlighted by Polidano et al.'s (2013) investigation into the gap in school completion that exists between low and high socio-economic status (SES) students in Australia. As they explain: 'A key finding of this study is that differences in education aspirations of students and their parents at age 15 is the most important factor explaining the gaps in school completion […] This finding is consistent with previous studies that have shown that own and parental aspirations are important in predicting test score outcomes […] and school completion' (ibid.: 243).

Another aspect of families that has been shown to be important is family structure and family stress. In their 2008 review of the dropout research literature, Rumberger and Lim (2008b:2) highlight how:

> changes in family structure, along with other potentially stressful events (such as a family move, illness, death, adults entering and leaving the households, and marital disruptions) increase the odds of dropping out.

In connection with this point, these authors cite four studies that had each found 'that family stress increased the odds of dropping out' (Rumberger and Lim, 2008a: 46).

School-level characteristics are generally limited as predictors of dropout

It is well established that student dropout rates vary in significant ways between different kinds of schools. In Australia, for example, Marks (2014: 336) described how several studies have shown that 'school non-completion is higher in government schools than in Catholic schools and lowest in independent schools'. When, however, school-related factors are examined alongside other influences such as student-related factors, the findings tend to suggest that the former are far less important than the latter as predictors of dropout.

Polidano et al.'s (2013: 243) analysis of the differences in school completion between low and high SES 15-year olds in Australia, for example, found that 'differences in levels of school characteristics after age 15 are relatively unimportant […] accounting for only 1.5 of the 19 percentage-point gap between low and high SES students'. Information on school characteristics in this study encompassed factors such as school resources, education programmes, governance, teacher quality, and peer quality. Marks' (2014) study of the student and school influences on reaching Year 12 in the state of Victoria reached similar conclusions:

> The school effects analyses show that much of the variation between individual schools in reaching Year 12 can be attributed to differences in the social, socioeconomic, and academic profiles of their students. School differences net of student intake characteristics are very much smaller than the observed (or raw) differences. (344)

And these findings echoed earlier work by Homel et al. (2012: 33) in Australia, which reported clearly that: 'School characteristics and resources have hardly any explanatory power over Year 12 completion, with the exception of the extent of adequacy of school physical facilities, which is marginally positively associated with completion.'

It is important to add, however, that the above findings about the limited relationship between school characteristics and Year 12 completion does not mean that all aspects of school are unimportant. There are some studies that have highlighted the importance of specific aspects of schooling, in particular classroom, school climate and teacher attitudes.

Fortin et al.'s (2013) longitudinal study of 672 students in Quebec, Canada between the ages of 12/13 years and 19/20 years, for example, reported 'negative classroom climate' as one of five latent factors that contribute to school dropout at 19 years of age. A negative classroom climate was revealed by 'the student's perception of a lack of order and organization in the classroom, limited student engagement in class activities and a global negative perception of the classroom social environment' (ibid.: 571).

Something similar was reported by Polidano et al (2013: 244) in the Australian context. In addition to establishing that school characteristics were 'relatively unimportant' (see above), this study also found that the gap in completion rates between low and high SES schools was reduced by 'more positive

attitudes of teachers in low-SES schools'. The researchers elaborate on this finding as follows: 'Principals of low-SES students report that learning is hindered less by teacher-related factors affecting the school climate than principals of higher SES students. A possible explanation is that low-SES schools put particular emphasis on school culture to motivate low-SES students' (ibid.: 244). It leads them to conclude by highlighting 'the particular importance of teachers in promoting a positive learning culture in low-SES schools' (ibid.: 245).

2.4 Accuracy of different kinds of predictors

This section focuses on the accuracy of predictors and what the research suggests about how accuracy can be measured and how it can be improved. It draws mainly on one review study that undertook a specific kind of quantitative analysis to compare the accuracy of 110 individual dropout indicators that had been used within 36 North American research studies (Bowers et al., 2013). This evidence is discussed in terms of two main messages:

- accuracy is about more than precision; and
- longitudinal models are most accurate but cross-sectional data and multiple indicators are also effective.

Accuracy is about more than precision

Bowers et al. (2013) defined and calculated accuracy in terms of three key components that are similar but distinct. They distinguished between: *precision* (the percentage of students who had the predictor who dropped out); *sensitivity* (the percentage of students who dropped out who had the predictor, 'the true positives'); and *specificity* (the percentage of students who had the predictor but did not drop out, 'the false positives' or 'false alarms').

Their argument is that it is common for studies to report on the precision of indicators, but much rarer for questions to be asked about their sensitivity and specificity. But the latter are important because, as they explain, the goal is 'to correctly identify the students who will drop out, without mistakenly flagging students who would have graduated anyway […or…] missing students who are actually at risk of dropping out' (ibid.: 98). In other words, the aim is to combine high sensitivity (large proportion of true-positives) with high specificity (small proportion of false-positives or false alarms).

Longitudinal models are most accurate but cross-sectional data and multiple indicators are also effective

Bowers et al. (2012) use the above conceptualisation to calculate and compare the sensitivity (true-positives) and specificity (false-positives) of 110 different dropout predictors using a particular statistical technique, Relative Operating Characteristic analysis. They found marked variation in the accuracy of the different predictors, and reported that:

- the most accurate dropout predictors were ones based on longitudinal growth modelling, that is ones that examine trajectories of student achievement (e.g. mathematics achievement from grades 7-12) or student engagement (e.g. student engagement trajectories from grades 8-12) over time;
- the next most accurate type of dropout predictor were ones based on simple cross-sectional school-based data, such as the 'the Chicago on-track indicator' which uses low course credits and failures in grade 9 to identify at-risk students; and
- it is more accurate to combine predictors in terms of *or* (i.e. selecting students who have predictor x or predictor y), rather than in terms of *and* (i.e. selecting students who have predictor x and predictor z), because 'different [indicators] may encompass different types of students who

are highly likely to drop out, so it stands to reason that multiple non-overlapping [indicators] would cast a wide net and capture the majority of students who drop out' (ibid.: 97).

These findings suggest that while longitudinal growth models can generate the most accurate predictors, there is definite value in the use of cross-sectional predictors based on school-level data such as grades, and combinations of multiple non-overlapping indicators.

2.5 Summary

Evidence base

There is a well-established research literature on the factors that can help to predict school dropout. The findings generated by this research provide a number of key messages that should be instructive for the process of identifying students at risk of disengagement and dropout.

Educational performance, student behaviour and socio-economic status are important predictors

- In relation to student-related predictors, it is clear that educational performance and student behaviour are the strongest predictors. Also important, though, are demographic factors such as gender and attitudinal factor such as educational aspirations.
- In terms of family-related and school-related predictors, family socio-economic status and family educational support are significant predictors of dropout. School-level characteristics, however, are generally limited as predictors of dropout.

Predictors should be measured longitudinally, but cross-sectional data is still useful

Finally, in relation to the accuracy of predictors, while longitudinal models have been shown to be the most accurate, cross-sectional data and multiple indicators are also effective. The latter should be encouraging for schools/school systems because cross-sectional data refers to predictors based on regular school-level data.

3   Use of Data to Identify Disengagement Risk

This section examines the research evidence on how schools and school systems use data to identify students at risk of disengagement. It begins by outlining what research is available on this topic, and then discusses the evidence in terms of three main themes: use of data from local authorities and local government; use of data within school-wide early warning systems; and use of data by teachers and other school staff. It concludes with a short outline of the key messages.

3.1 Research on the use of data

Generally speaking, each of the main topics relating to data use (i.e. use of data from local authorities/government, use of data within school-wide early warning systems, and use of data by teachers and other school staff) has a fairly distinct collection of relevant research.

In terms of the use of data from local authorities and local government, the relevant research here comprises two major UK studies on young people defined as 'not in Education, Employment or Training' (NEET). Filmer-Sanskey and McCrone (2012) undertook a scoping study to provide evidence around the early identification of young people at risk of temporary disconnection from learning. The research involved survey and telephone interviews in seven Local Authorities (LAs), including senior leaders in three schools. Southcott et al. (2013) then undertook a follow-up study to provide further evidence to support the development of tools for practitioners. This work involved surveys of 216 schools and 78 Local Authorities, followed by 20 telephone interviews. In Australia, the Education Engagement Project (2013) describes a collaboration between the local agencies, including some schools, in the cities of Stonnington and Port Phillip. In addition, Crump and Slee's (2015) literature review and case study report on 'school transitions for vulnerable young people' provides some recent insight into how schools can use that data to facilitate local and government support.

On the theme of use of data within school-wide early warning systems, there were six publications: two What Works Clearinghouse (WWC) systematic reviews, one experimental study, a practitioner guide and a peer-reviewed journal article. The two WWC systematic reviews resulted in 'dropout prevention' practice guides,that included the use of data in the process of dropout prevention (Dynarski et al., 2008; Rumberger et al., 2017). Faria et al.'s (2017) experimental study revealed insights around how schools are experiencing using 'early warning' systems, specifically the data they use, the challenges and the successes.

Through a 'what's known' review of early warning system research commissioned by the Institute of Education Sciences (IES), Frazelle and Nagel (2015) produced a practitioner's guide for the Unites States Department of Education that summarized early warning implementation. In addition, Soland's (2013) peer reviewed article, reports on analysis of data from the National Education Longitudinal Study (NELS) to compare the accuracy of teacher judgement when predicting dropout with that of early warning systems.

Finally, in terms of use of data by teachers and other school staff, there were five US research studies and one Australian case study. Bowers (2010) investigated the use of hierarchical cluster analysis (HCA)4 as a tool to assist 'data driven decision making' by school personnel, using early dropout identification as a 'proof-of-concept study'. Bowers examined whole cohort student grade history patterns from a longitudinal study of 188 K-12 students (two cohorts from two USA districts) and compared the HCA method with past methods of dropout identification. The Soland (2013) study noted above included a literature review on early warning systems and the relative accuracy of intuition. Part of this study involved comparing teacher predictions of student outcomes with those generated by early warning systems and assessing whether accuracy in teacher judgment stems from additional information not in models.

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[4] Hierarchical cluster analysis (HCA) is a form of data mining, patterning and visualization.

Carter et al. (2012), using the Student Engagement Instrument—Elementary Version (SEI–E), examined the potential use of cognitive and affective disengagement data in primary years. This student-perspective survey tool is based around cognitive and emotional engagement measures. Rather than focussing on the more observable behavioural and academic outcomes, this study provides an alternative view of analysing student data on observable cognitive and emotional measures, through student voice. Whilst primarily a discussion on student engagement, the discussion and implications section also presents the findings in the context of dropout prevention. Finally, Turnbull (2013) provides a single school case study on the effectiveness of the Hands on Learning program. Whilst primarily looking at the effectiveness of an early intervention, the case study provides an insight into how one Australian school is using teacher-collected data, within a data collection tool, to identify students at risk of disengagement.

3.2 Use of data from local authorities and local government

Research evidence around schools collaborating with local authorities or councils to develop tools to identify students at risk of disengagement is limited. However, reviewing the recent studies that have been undertaken provides some insights into the kind of data that is being used and the issues that can arise. In particular, it suggests that:

- schools and local agencies can share and modify data to develop 'at risk' indicators;
- qualitative data can be used to 'pick up' on overlooked at-risk young people; and
- time and the qualitative data are considerable challenges.

Schools and local agencies can share and modify data to develop 'at risk' indicators

Both the UK studies establish that data is collected by the local authorities (LAs) from several sources including school data, which is generally collected in School Information Systems (SIMS). The data the LA collects is closely 'correlated' with becoming 'not in Education, Employment of Training' (NEET). This typically includes:

- attendance and exclusion rates
- eligibility for free school meals (FSM)
- special educational needs (SEN)
- looked-after children (LAC)
- traveller; and
- whether the young person has a Common Assessment Framework (CAF).

The local authorities then develop a NEET Indicator tool in consultation with the schools. Schools then commonly use their own locally contextualised data to modify the LA's list (Filmer-Sankey and McCrone, 2012; Southcott et al., 2013).

Local context is important when using the data to develop the list of 'Risk of NEET Indicators' (RONIs). The RONIs are modified depending on the characteristics of the local area, for example asylum seeker/refugee status or English as an Additional Language may not be characteristic of their area and therefore left off the list. Conversely, these factors may be very important in which case they may be more heavily weighted. In addition to modifying the tool to reflect the characteristics of the local area, schools in three different local areas were modifying the RONIs with qualitative, or 'soft', data in order to identify young people who may otherwise have been overlooked if using just the indicators picked up by the 'hard' data.

An example from Australia of a similar collaborative data collection practice between schools, council and government agencies is evidenced through Crump and Slee's (2015) 'school transitions for

vulnerable young people' report. Using the premise that transition from primary to high school is an important cusp point for early intervention against education disengagement, they state:

> Data from the Cities of Port Phillip and Stonnington identified a high number of young people both at risk of and currently disengaged from local education opportunities through low participation and poor achievement, or, increasingly, non-attendance. (ibid: 13).

The cities of Stonnington and Port Phillip Education Engagement Partnership (EEP) consists of eighteen local youth service agencies (including schools). The EEP collects and analyses cross agency data to support improvements for youth who are disengaged, or at risk of disengaging, from education (EEP, 2013). The Victorian Department of Education and Training's Inner South chapter of the School Focused Youth Service (SFYS) covers schools within the Cities of Stonnington, Port Phillip and Glen Eira and works closely with the EEP. The EEP agencies report cumulative snapshots of local issues to inform local practice. The SFYS then use a screening document to report 'at risk of disengagement' factors identified by the local agencies 'to enable identification by teachers of students who could benefit from increased support during transition' (Crump and Slee, 2015: 13).

Qualitative data can be used to 'pick up' on overlooked at-risk young people

The evidence reported by both of the UK studies cited above suggests that schools were using anecdotal evidence and qualitative data in addition to what the SIMS data showed as 'Risk of NEET Indicators'. Additional points were added if it was known that a young person had other factors or issues, such as difficult social relationships, lack of involvement in school activities, clubs or work experience opportunities, lack of parental involvement, personal or family problems, or substance misuse (Filmer-Sankey and McCrone, 2012; Southcott et al., 2013).

Four of the seven LAs in the study reported they only wanted to include data in their RONIs list which was 'hard, fast, and measurable' (Filmer-Sankey and McCrone, 2012:5). However, they stated that they would also 'glean [the qualitative data] from discussions with personal tutors and Connexions personal advisors' (ibid: 5). One LA was using a data mining tool to pick up key words from qualitative data such as murder, alcoholic and abuse. It was their view that 'it is the interaction between these 'hard' and 'soft' indicators which determines whether a young person is likely to become NEET' (Filmer-Sankey and McCrone, 2012: 5). Furthermore, the Southcott et al. (2013) study confirmed schools and local authorities recognised that schools were the best place to use the soft data with one LA reporting that the tool on its own was only 50% effective in identifying young people at risk and that it was the moderation (or adaptation) of the tool supplied by the LA with the soft data collected by schools that made the tool worthwhile. The study also found that schools valued this process of moderation/adaptation using their local knowledge and context.

An outcome of the Southcott et al. (2013) study was the development of a checklist of NEET risk factors for schools. The checklist allowed for the addition of school-based qualitative data and could be used to raise awareness of the risk factors among staff, support a consistency in schools' identification processes, and to 'facilitate conversations with other agencies about interventions or as a discussion tool with young people' (Southcott et al., 2013: ii).

3.2.1 Time and the qualitative data are considerable challenges

The Filmer-Sankey and McCrone (2012) study raised some concerns around including the more qualitative data in a set of RONIs. These concerns included the variability of the input processes, the risk indicators being only as good as the data uploaded into the school management systems, the risk of subjectivity, and the risks of confidentiality and stigmatism in collecting and sharing qualitative data.

Time and timing were also raised as concerns, in both studies, in several contexts. It was identified that the data needed to be uploaded in a timely manner in order for the young person to be identified early. Additionally, schools do not have the time or resources for 'lengthy' processing, thus including qualitative

data may make the process 'cumbersome and impractical' (Filmer-Sankey and McCrone, 2012). The authors also suggest there was some evidence that young people at risk could be identified earlier, at the Year 7/8 stage; most schools and local authorities were collecting data at the Year 9/10 stage (Southcott et al., 2013).

3.3 Use of data within school-wide early warning systems

As noted above, five publications were identified that report specifically on the use of data within early warning systems within schools. Taken together, the findings of these studies highlight:

- the importance of monitoring *all* students;
- the importance of focusing on certain key indicators;
- the early impacts of early warning systems; and
- the importance of effective implementation and school data culture.

The importance of monitoring *all* students

In the 2008 practice guide (Dynarski et al., 2008), the panel recommended using data systems to regularly analyse student data as a 'critical first step both for determining the scope of the dropout problem and for identifying the specific students who are at risk of dropping out' (ibid: 12). The 2017 update, using 25 studies, fifteen of these published after 2007, reported that, as a result of the implementation of the previous recommendations, there had been improvements in monitoring at-risk students' (Rumberger et al., 2017: 1). Using data for early identification of students at risk of dropout is one of the three over-arching themes in the updated practice guide. The use of data to monitor all students, not just those already off track, is addressed in Recommendation 1:

> The panel recommends that schools monitor data for all students and intervene when students show signs of being at risk as a preventative measure. Schools may be inclined to focus their resources on students already off track for graduation, but this approach can overlook students who are just starting to fall off track. By monitoring all students, schools can intervene proactively, reducing the effort and resources needed to help students graduate on time, and increasing the likelihood these students will graduate (Rumberger et al. 2017: 8).

The panel asserts 'by monitoring all students, schools can intervene proactively, reducing the effort and resources needed to help students graduate on time, and increasing the likelihood these students will graduate' (ibid: 8).

The importance of focusing on certain key indicators

This updated recommendation addresses early identification of students at risk of dropping out through the use of data collection systems. It is described as preventative, proactive and including 'a stronger focus on attendance, which recent evidence indicates is especially important for dropout prevention' (Rumberger et al. 2017: 6). Each recommendation provides guidance for implementations through stepped stages and advice around potential challenges. Recommendation 1 advises:

> Monitor the progress of all students, and proactively intervene when students show early signs of attendance, behaviour, or academic problems.

> Step 1: Organize and analyse data to identify students who miss school, have behaviour problems, or are struggling in their courses.

> Step 2: Intervene with students who show early signs of falling off track.

> Step 3: If data show high rates of absenteeism, take steps to help students, parents, and school staff understand the importance of attending school daily.

> Step 4: Monitor progress and adjust interventions as needed. (ibid: 2).

The first step involves monitoring routinely collected data around three key 'early warning' indicators described as the A, B C's: Attendance, Behaviour and Course Grades. This step recommends benchmarks be set for the individual school that 'flag' when a student is at risk – for example: daily attendance of 90% or less; three or more days of suspension; failing English or Mathematics. The step also recommends that staff meet regularly to review the data and decide which students may require an early intervention. The second step involves using the data and subsequent team analysis to provide early interventions for the identified students. At a school level, high rates of absenteeism could trigger a school-wide intervention to address attendance messages with students, parents and staff. The final step within the 'data use' recommendation is to continually monitor the data and make adjustments, on an individual or school-wide level, as required.

Several data-related challenges to successful outcomes were identified: timely access to academic data, for example some reports only being printed at the end of a term; interventions occurring after course failure is identified, rather than at the first indication of a student struggling with course-work; limited access to data by the staff using it; staff not having enough time to monitor and analyse data regularly; and data not being entered into the system in a timely manner. In addition, several barriers in using the tool were identified: technical difficulties uploading student data; staffing issues, such as changes in staff reducing the effectiveness of the data team; and lack of professional development opportunities around using data.

The early impacts of early warning systems

The impact of an Early Warning Intervention and Monitoring System [EWMIS] on identifying mid-west USA high school students at risk of dropout was examined in a study by Faria et al. (2017). Over a one-year period, 37 high schools implemented the EWIMS (18,634 students) and 36 high schools continued usual practice (19,037 students). This EWIMS model used data system tools within a seven-step process, with step two to four including the collection and use of data.

The data collection process used student demographics (gender, race/ethnicity, identified disability, and English learner and economic status), incoming risk flags (data collected about the student from their previous school), attendance, course failure, GPA, behavioural, and cumulative credits data. This data would then 'flag' students considered at risk of dropping out through set thresholds for each of the categories. The tool also allowed for customisation to cater for local and school context, and produced four summary reports: Student Flag Report, Data Import Report, Student Intervention Report, and Student Data Report.

The results of the research revealed that EWIMS reduced the percentage of students with risk indicators related to chronic absence and course failure. However, during the one year of the study, the EWIMS did not reduced the percentage of students with risk indicators related to low GPAs or suspension. The authors recommended further research to better understand the mechanisms through which the EWIMS had an impact on chronic absence and course failure and why the EWIMS did not affect other outcomes – including the impact on school data culture.

The Faria et al. (2017) study also included analysis of the school data culture, the ways in which schools used data to make decisions and identify students in need of additional support, but found no discernible change during the timeframe of the study. The EWIMS did not have a detectable impact on school data culture. Additionally, the EWIMS schools did not differ from control schools in the frequency of data review or the number and type of interventions offered.

School data culture was identified as a barrier by Frazelle and Nagel (2015) who reported that early warning systems need to be part of a regular cycle of data use by teachers and principals with attention to system-level implementation, active endorsement and support across all levels of leadership. In addition, professional development needs to be provided to all system users, including around the roles each team member will play and the how they analyse and use the data.

The importance of effective implementation

Through a 'what's known' review of early warning system research commissioned by the Institute of Education Sciences (IES), Frazelle and Nagel (2015) produced a practitioner's guide for the Unites States Department of Education that 'summarizes what is known about early warning system implementation and describes how states, districts, and schools can draw on the research to inform their work locally' (i).

The guide discusses five core components of early warning system implementation. Within each of these components, critical elements involving the use of data were identified:

1. Key data team roles such as project leader(s), information technology staff and data coach along with professional development

2. Effective data indicators that are valid for the intended purpose, actionable by schools, meaningful and easily understood, and aligned with district and school priorities. Indicators must be valid and identify unique leverage points (i.e. local context) for intervention. In addition, focusing on a small set of indicators, such as attendance, behaviour and course progression can allow teams to allocate their time and effort more efficiently. Once well established, data teams can add additional indicators.

3. Designing and using reports through compiling data that identify student progress toward graduation and alert staff when the data indicate that a student is falling off track. These need to be simple but effective and consider the audience. In addition, they need to be routinely created and used through regular data and report updates and team meetings.

4. Using attendance, behaviour and course performance data and thresholds to determine the level and type of early intervention. Examples given were: using the indicator of attendance, every absence brings a response creating a school culture that says attending every day matters; using the behaviour indicator, staff would teach, model and expect good behaviour; and using the academic indicator, the school would use research-based instructional programs.

The guide emphasises that providing data alone will not produce a successful system. A successful system needs to be actively endorsed and supported 'across all levels of leadership and [provide] professional development to all system users . . . as part of a framework to incorporate data use into decision making' (Frazelle and Nagel, 2015: 14).

Further to this, Soland (2013: 259) states that 'districts must consider how they intend to use EWS when constructing them'. Soland conducted a study that compared the accuracy of teacher judgement when predicting dropout with that of early warning systems and concluded 'as a renewable source of information for organizing discussion about early intervention for students' early warning systems, using indicators such as attendance and course failure, were a practical tool. However, if the aim is to increase precision, provide insight, and monitor that the subjectiveness of teacher judgment is not overly subjective, 'then a more developed statistical model could be useful'. The accuracy of teacher judgment in predicting student outcomes is discussed further in the next section.

3.4 Use of data by teachers and other school staff

The five US research studies and one Australian case study discussed in this section examine the role and value of teacher-collected data. This research suggests that:

- teachers can be quite accurate in their predictions of dropout;

- affective and cognitive data collected from students could support early identification; and

- understanding peer issues and family background is important.

Teachers can be quite accurate in their predictions of dropout

In the Bowers (2010) research study mentioned earlier, the author cites methods used by Gleason and Dynarski (2002) (e.g. student surveys with variables such as family on public assistance, sibling dropout, high absenteeism) having accurate dropout predictions of 23% (middle school students) and 43% (high

school students), and methods used by Balfanz et al. (2007) (logistic regression analysis to identify a 'combination of flags') having an accurate predication of 60% using a grade 6 cohort study. Bowers, using teacher-assigned grades in the HCA, was able to predict with 88.8% accuracy in the K-12 cluster, 93.9% in the K – 8 cluster and 63% in the K-6 cluster. Thus, teacher accuracy was higher in the K-12 and K-8 clusters and at least as accurate in the K-6 cluster.

The argument that Bowers (2010) makes is that analysing already collected student data, such as teacher-assigned grades, and analysing that data using an HCA tool, is easier and more accurate than other systems and has the potential to enable teachers and administrators to make informed decisions about their own at-risk students earlier. Based on his own previous 2009 research, Bowers (2010) argues that teacher-assigned grades can more accurately predict dropout than standardised testing grades. He claims that while '25% of the variance in grades is attributable to assessing academic knowledge . . . the other 75% of teacher-assigned grades appear to assess a student's ability to negotiate the social processes of school . . . (and) . . . these Success at School Factors (SFF) appear to be a fairly accurate assessment of overall student outcomes, such as graduating on time' (p. 2).

The Soland (2013) study includes a literature review on early warning systems and the relative accuracy of intuition. The research study then compares teacher predictions of student outcomes with those generated by early warning systems and assesses whether accuracy in teacher judgment stems from additional information not in models. Soland found that on average, teacher predictions were accurate over 88% of the time for dropping out and 74% of the time for college going. However, where teachers were unsure or disagreed, the EWS predictions of college going were more accurate. There was also evidence that use of the EWS could produce a reduction in teacher judgement bias.

Soland (2013) used aggregate measures of academic preparedness and academic tenacity to measure teacher accuracy. Soland determined that teachers' accuracy in their predictions was because 'they relied on academic tenacity data not easily captured in administrative datasets' (2013: 259). Soland argued that teachers and EWS collect and weigh the same data differently when forecasting and therefore: conversations about at-risk students might best be facilitated by identifying areas of overlap between teacher and EWS predictions, as well as reconciling differences. Model predictions should not be treated as sacrosanct simply because they are statistical in nature (259).

Affective and cognitive data collected from students could support early identification

Carter et al. (2012) examine the potential use of the already well established high-school-based Student Engagement Index (SEI) survey tool in the elementary years (SEI-E, a simpler, four factor model without the Control and Relevance of School Work measure). One of their reasons for extending the SEI, was to allow for the 'early detection of students at risk for disengagement, thereby aiding in student advisement practices and dropout prevention/intervention practices' (Ibid.: 64).

Measuring affective and cognitive engagement via student collected data is purported as relevant based on evidence of strong correlations of high interference between teacher and student-self report ratings of behavioural and/or emotional engagement. The authors found that the SEI and the SEI -E, 'may help provide school psychologists and researchers with a tool to quickly identify students at risk for disengagement and dropout' (Carter et al. 2012: 64).

Understanding peer issues and family background is important

As identified in the studies discussed earlier, teachers and school psychologist are better placed to identify the more subjective data that can provide evidence for identifying students at risk. The following three studies provide examples of how this qualitative, or 'soft', data can be used for earlier identification of students at risk.

The Filmey-Sankey et al. (2012) study, determined that the quantitative data collected by the local authority and used by schools was strengthened when supplemented by teacher-collected data. The

study revealed that the schools needed to modify the tool to add in their local context and gather the more subjective data collected by teachers to provide stronger data/evidence for identifying 'at risk' students. As part of the scoping study findings, the research team recommended a list of indicators of risk of disengagement be developed to be used as 'an ongoing record of a young person's profile to be completed by a member of staff who knows the young person' (2012: 12). Furthermore, it was emphasised that the list should be more than a quantitative tool by including the addition of the 'softer' data used by the schools as a guide to help staff to identify the 'causes' of potential disengagement, the 'effect' and the possible solutions. The 'soft' data included personal and family factors and attitudinal and aspirational factors (see Appendix 5 for the recommended list).

The Southcott et al. (2013) study strengthened these findings and built upon on the NFER checklist developed by Filmer and Sankey (2012). For the Southcott et al. study the factors were grouped in six themes (see Appendix 6 for the full list):

• Theme 1: Factors associated with structure/environment

• Theme 2: Factors associated with level of attainment/educational needs

• Theme 3: Factors associated with local education services

• Theme 4: Factors associated with personal/family circumstances

• Theme 5: Factors associated with attitude/aspirations

• Theme 6: Factors associated with progression routes.

The schools in the study were surveyed on each factor's usefulness and the authors reported evidence that teachers valued the opportunity to modify the 'more measurable' local authority data, and that 'using a mix of hard, measurable and soft, attitudinal data is important to allow a more holistic approach to the identification and understanding of young people at risk of disengaging' (Southcott et al., 2013: 13). Furthermore, 'the evidence shows that schools would find the NFER checklist of indicators useful, particularly if it links to strategies to re-engage young people, as the checklist enables school staff to understand the reasons why a young person is at risk of disengaging' (13).

These findings led to the development of a data collection tool for teachers, the CPD tool: READING THE SIGNS[5]. This tool is an interactive checklist of indicators for identifying the reasons why young people may disengage. Within the tool teachers collect data on a range of indicators beyond the academic and behavioural, to increase awareness of the reasons for disengagement and includes a discussion aid 'to promote more self-awareness amongst young people' (16).

An Australia example of a similar tool is demonstrated in the Turnbull (2013) report. This single-school case study investigates the impact of the Hands on Learning (HOL) program[6], an early intervention strategy currently in place across seven Victorian school districts. Students eligible for the program are identified as 'at risk' for disengagement through data collated by the teachers across three domains: academic, peer and family. Turnbull reports that 'young people are identified as potentially suitable for inclusion in a HOL class based on the range of social and academic indicators of disengagement or risk' (7). The data within each domain resonate with the NFER Checklist's Themes 4 & 5:

1. Academic: difficulty with completing learning tasks; avoidance so as to conceal an inability to cope with the program

2. Peers: engages in behaviour that alienate them; socially isolated and unable to sustain friendships; dysregulated and impulsive

3. Family: ongoing issues related to poverty; family has high levels of needs due to mental health/disability/homelessness; family requires support with parenting

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[5] https://www.nfer.ac.uk/

[6] http://handsonlearning.org.au/

Similar to the NFER Checklist, the HOL checklist also provides suggested interventions appropriate to each domain (see [Appendix 7](#) for full table).

3.5 Summary

Evidence base

In contrast to the well-established research literature on dropout predictors discussed earlier, the research literature on how schools and school systems use data is still developing, particularly in Australia. The studies that have been undertaken, though, highlight several points that could be informative for the development of practice within and across schools and jurisdictions.

Schools and local agencies can work together to develop 'at risk' indicators

- Schools collect their own data but can also share and use data in a collaborative manner with local agencies and government departments. Whilst this sharing of data is useful, schools do need to modify local agency data to develop their own localised 'at risk' indicators.

- Often the additional data schools use is qualitative data interacting with the quantitative data. Providing this additional information about a young person can be used to 'pick up' on overlooked at risk young people. There are challenges in collecting and using extensive collections of data including time and quality issues.

Early Warning Systems provide lessons for data-based identification

- Early Warning Systems (EWS) are being increasingly used in US schools, and the collection and use of data is integral to these initiatives.

- The research-based guidance on EWS implementation emphasises the importance of monitoring all students, not just those already considered at risk and using the key indicators of attendance, behaviour and course progression.

- Barriers to effective use of data were identified as the timeliness of data input and output, the quality of data input, and staffing issues including maintaining effective data teams' professional development.

Additional insights from teachers and school staff can enhance early identification

- Teachers collect qualitative and subjective data that can be critical in the early identification of students that are not necessarily 'picked up' by the more frequently collected quantitative data. Teacher intuition and judgment has proven quite accurate in predicting the student outcomes.

- The research suggests that data use for identifying students at risk is enhanced by the inclusion of qualitative and subjective data collected by teachers and school staff. Such additional data can provide insights into students' affective and cognitive dispositions through understanding their peer relationships and family backgrounds.

4 Early Interventions to Prevent Disengagement

This section moves the focus from identification to intervention, by examining the research evidence on early interventions to prevent disengagement. It starts by considering the nature of the current research on the topic, and then discusses the specific evidence relating to: the efficacy of dropout prevention programs, the efficacy of truancy prevention programs and the research-based guidelines on dropout prevention. A summary of key messages is provided at the end.

4.1 Research on early interventions

The studies in this section varied in their design and also their focus. Several studies included in this section were obtained from the grey literature, which may have implications for quality in terms of not necessarily having been subject to peer review processes prior to publication. Systematic and narrative reviews (n=9) primarily reported on the efficacy of dropout prevention programs (DPPs), with two reviews also reporting on the efficacy of prevention programs focused on truancy, which will be referred to as 'truancy prevention programs' (TPPs). Four quasi-experimental studies were identified which also focused on DPPs (n=2) and TPPs (n=2). Finally, two cluster-randomised controlled trials focused on TPPs. The findings for this section of the review will be split into two sections to examine the efficacy of DPPs and TPPs separately.

The studies included in the review of DPPs and TPPs largely focused on evidence from within the USA. Four of the nine identified systematic and narrative reviews primarily included studies completed in the USA (Freeman et al., 2015; Klima et al., 2009; Sullivan and Sadeh, 2016; What Works Clearinghouse, 2008). Furthermore, five of the six included primary studies were undertaken in the USA (Briones et al., 2015; Cook et al., 2017; Corrin et al., 2016; Faria et al., 2017; The Smith Family, 2018; Walsh et al., 2015). The one primary study that was not undertaken in the USA was carried out in Australia (The Smith Family, 2018). Thus, the findings obtained from systematic and narrative reviews will provide a greater international perspective than the primary studies.

The overall quality of the systematic and narrative reviews was moderate. This was largely due to reviews either not completing a quality appraisal of the included studies or not reporting it. Furthermore, screening processes and data extraction were often not duplicated or not reported as duplicated. Overall, moderate confidence can be had in the findings from these reviews. The overall quality of the quasi-experimental and cluster-randomised controlled trials was moderate. Only one study was identified as having a low appraisal score. The studies largely under reported the control intervention delivered, or did not provide sufficient information to determine that all participants were treated similarly (apart from for the intervention). It was also often unclear if follow-up was complete and if reliable outcome measures were used. Overall, moderate confidence should be had in the findings from these studies.

4.2 Efficacy of Dropout Prevention Programs (DPPs)

The evidence on DPPs can be understood in terms of three main messages:

- Dropout Prevention Programs can reduce dropout;
- Implementing more DPPs with more components could be more effective; and
- Certain DPPs show promise for preventing disengagement but more research is needed.

Dropout Prevention Programs can reduce dropout

Six studies examined the effects of dropout prevention programs (DPPs) on disengagement, primarily dropout, absenteeism and attendance (Appendix 3). All studies, including five systematic reviews, reported that DPPs reduce dropout rates and/or absenteeism and poor attendance. Steinka-Fry et al. (2013) reviewed 13 studies internationally and reported that DPPs almost double the odds of pregnant and parenting students graduating high school compared to students who did not receive the program,

with community-based and school-based DPPs achieving similar results. The authors reviewed how well the programs were delivered and concluded that the programs that were better delivered (i.e. all components of the program were delivered and in the way they were intended) had better outcomes.

Tanner-Smith and Wilson (2013) reviewed 74 studies internationally and concluded that DPPs significantly reduce both absenteeism and dropout of students. The authors stated that no DPP appeared better than the others but that vocational and academic training programs were the most promising and better results were seen for male students and younger students. Wilson et al. (2011) reviewed 167 studies internationally and reported that DPPs significantly reduce the risk of dropout for both the general and teen parent populations. Community-based DPPs were considered less successful at preventing dropout compared to classroom-based programs and school-based programs supplemented with community programs. Steinka-Fry et al. (2013) and Wilson et al. (2011) both concluded that longer DPPs did not have better outcomes compared to shorter DPPs, with Wilson et al. (2011) also concluding that less contact within the programs might even lead to better outcomes. Overall, DPPs can be successful at reducing dropout.

Implementing more DPPs with more components could be more effective

Several of the studies included in this section suggested that using more DPPs, or DPPs that include more components, are likely to be more successful than using less DPPs or DPPs that contain fewer components. Briones et al. (2015) conducted a quasi-experimental study where they compared the dropout and graduation rates of high school students from four schools in Texas. The authors found that the schools that had multiple DPPs in place (≥4) had less dropout and higher graduation rates compared to schools that had <4 DPPs in place. The suggestion that better outcomes can be expected from DPPs with more components, or simply using more programs, is also supported by two systematic reviews. Freeman et al. (2015) reviewed 21 studies completed in the USA and found that 16 of the studies reported either statistically significant or marginally significant improvements in dropout or school completion rates. Nine of these studies used a multifaceted approach, where the intervention included at least two of the following strategies:

- academic;
- attendance;
- behavioural;
- study skills; or
- Organizational or structural school-level.

The remaining studies included in the review used less components (i.e. academic strategies, or organizational or school-level structural strategies) but also showed positive effects. Specifically for pregnant and parenting teens, providing free childcare and medical support was also successful to prevent dropout.

Another review of 38 reports and studies completed internationally demonstrated that DPPs that use at least four strategies have the best outcomes on dropout and attendance rates (ICF International and National Dropout Prevention Center/Network, 2008). The authors outlined several strategies that they identified in the most successful DPPs:

- program includes both school and community groups;
- learning environments are safe and include violence prevention plans and behavioural management;
- families are actively involved in the program;
- students receive mentoring from a trusted adult;

- the program uses alternative schools[7] that focus on goals important to the student;
- the program uses active learning that engages students;
- teaching career-based skills; and
- staff delivering the programs are trained well.

Therefore, delivering more than or equal to four DPPs in the one school, or delivering DPPs that are multifaceted, has the potential to successfully reduce poor attendance, and improve dropout and graduation rates.

Certain DPPs show promise for preventing disengagement but more research is needed

Several specific DPPs were identified in the literature as having promising outcomes for the prevention of disengagement (Appendix 3). Overall, the programs demonstrated the ability to reduce dropout, increase attendance and support progression through school. Some DPPs are better researched than others (e.g. Check and Connect has been examined more than City Connects) and the following discussion will progress from the most to least researched programs. It is important to remember that programs that have been under-researched are not necessarily less efficacious than those that have been researched extensively.

Check and Connect[8] is a program that involves *checking*, where a monitor continuously assesses students' engagement with school, and *connecting*, where program staff provide a personalised and timely intervention specific to the students' educational progress together with the student, school, family and community (Sinclair et al., 2005). The efficacy of Check and Connect was examined by three systematic reviews and one narrative review (Ekstrand, 2015; ICF International & NDPC/N, 2008; Sullivan et al., 2016; What Works Clearinghouse, 2008) and had strong evidence for reducing dropout and improving attendance. What Works Clearinghouse (2008) produced a review of 84 studies (including 22 interventions) completed in the USA that reported Check and Connect had high quality evidence to suggest that it can prevent dropout and support progression through school. ICF International & NDPC/N (2008) also concluded that Check and Connect can reduce dropout rates as well as increase attendance outside of the USA. Sullivan et al. (2016) performed a systematic review but only found one study on the efficacy of DPPs for students with emotional disturbance in the USA. The authors found that Check and Connect improved attendance and risk factors for dropout (e.g. truancy and mobility) but did not improve the number of students with emotional disturbance graduating. Finally, Ekstrand (2015) reviewed 155 studies internationally to conclude that Check and Connect increased self-control and decision making and social skills. The authors expect that, due to these improvements, the intervention shows promise for also reducing truancy.

Career Academies[9] are alternative schools within the main school that focus on career readiness by including vocational education with academic studies (ICF International & NDPC/N, 2008). Students can also participate in internships (ICF International & NDPC/N, 2008). The efficacy of Career Academies was examined in three systematic reviews which concluded that Career Academies had positive impacts on disengagement. All three reviews reported that Career Academies can successfully reduce dropout risk (ICF International & NDPC/N, 2008; Klima et al., 2009; Sinclair et al., 2005). Career Academies were also reported to improve progression through school (What Works Clearinghouse, 2008). Klima et al. (2009) mainly focused on reviewing US studies when they found that Career Academies also increased graduation rates.

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[7] An 'alternative school' is defined as "separate buildings with specialized academic and other services for at-risk students" by Klima et al., 2009, p. 1

[8] http://checkandconnect.umn.edu/

[9] https://www.ncacinc.com/nsop/academies

Achievement for Latinos through Academic Success[10] is a DPP that involves assigning Latino students at-risk of dropout a counsellor who monitors their attendance, provides them and their family access to useful services and updates the parents on the progress of their child (ICF International & NDPC/N, 2008). The efficacy of Achievement for Latinos through Academic Success has been examined in two systematic reviews. Both reviews reported that Achievement for Latinos through Academic Success reduced dropout rates (ICF International & NDPC/N, 2008; What Works Clearinghouse, 2008). Achievement for Latinos through Academic Success was also reported to increase attendance (ICF International & NDPC/N, 2008) and progression through school (What Works Clearinghouse, 2008).

Four further programs were identified in one study each. All programs were identified as efficacious at reducing dropout (Ekstrand, 2015; ICF International & NDPC/N, 2008; Walsh et al., 2015; What Works Clearinghouse, 2008). **Communities in Schools** uses case management to directly provide students at risk of disengagement with services or link them with relevant community programs and agencies (ICF International & NDPC/N, 2008). Communities in Schools has been found to increase attendance at school, as well as reduce dropout (ICF International & NDPC/N, 2008). **Accelerated Middle Schools**[11] are academic programs that are self-contained and can exist within or external to a traditional middle school to provide students one to two years behind their peers to catch up on content while continuing to progress through high school with their peers. Accelerated Middle Schools have been shown to improve progression through school as well as reduce dropout (What Works Clearinghouse, 2008).

City Connects is a program that involves a coordinator (social worker or counsellor) who works with classroom teachers to identify student needs, connects students with community supports, tracks student progression and follows up with the student to ensure the program has been effective. It is highly reliant on the teacher and parents working together (Walsh et al., 2015). City Connects has been evaluated in a quasi-experimental study of 22,244 USA high school students where the dropout rates of students who received City Connects in elementary school (n=2265) were compared to those who did not receive the program (n=19,979). The study found that students who received City Connects had half the odds of dropping out of high school compared to students who did not receive the program (Walsh et al., 2015). Thus, delivering DPPs early in schooling can reduce the number of students dropping out as they reach high school.

The Positive Behavioural Intervention and Support (PBIS) program[12] intends to support the development of decision-making skills and self-control while also supporting positive relationships between students and teachers. Furthermore, the program aims to support the school to adopt a dropout-prevention focus, thereby having the capacity to prevent dropout. Ekstrand (2015) included this program in their review but did not closely examine the program's efficacy. Rather, they simply suggested the program was efficacious at reducing dropout.

In addition to the main programs above, another promising strategy for preventing disengagement is mentoring. **Mentoring** has been identified as a component of DPPs and a DPP in its own right and can be defined as involving positive role models who support the student at risk of disengagement with academic and social issues (Klima et al., 2009). The systematic review by Klima et al. (2009) found that mentoring had the largest statistically significant effects for reducing dropout. Mentoring was also found to increase presence at school (Klima et al., 2009). Furthermore, two systematic reviews identified mentoring as important components of successful DPPs (ICF International & NDPC/N, 2008; Wilson et al., 2011). Thus, mentoring should be considered as a valuable component to include when designing DPPs.

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http://www.ndpc-sd.org/documents/Evidence_Based_Practices/ALAS_Model_Description.pdf
[11] https://ies.ed.gov/ncee/wwc/Docs/InterventionReports/WWC_AccelMiddleSch_070808.pdf

[12] https://www.pbis.org/

4.3 Efficacy of Truancy Prevention Programs (TPPs)

The evidence on TPPs can be understood in terms of two main messages:

- Truancy prevention programs have a small effect on attendance; and
- No specific TPP is better than another.

Truancy prevention programs have a small effect on attendance

Two reviews reviewed the efficacy of various truancy prevention programs (TPPs)(Ekstrand, 2015; Klima et al., 2009) on poor attendance and, more specifically, truancy (unauthorized absence) ([Appendix 4](#)). Klima et al. (2009) grouped TPPs and DPPs in their systematic review and concluded that programs that target both truancy and dropout can have positive effects on school attendance. Of the programs reviewed by the authors, Career Academies showed promise for increasing school presence. In contrast, youth development programs, academic remediation and alternative schools showed no effect or small effect on presence at school (Klima et al., 2009). The authors reported that programs might be less successful if they involve removing students from school (e.g. alternative schools) compared to keeping them within the school environment (e.g. alternative educational programs)(Klima et al., 2009). Furthermore, alternative educational programs, behavioural programs and school-based mentoring were identified as TPPs that can improve attendance (Klima et al., 2009). The narrative review by Ekstrand (2015) was broad but included one study specific to TPPs and unauthorized absence. The authors suggested that supporting students to feel successful at school by helping them to strengthen their main competencies, enhancing students' social confidence and trust, having a positive school environment and opportunities to bond with adults can prevent truancy (Ekstrand, 2015). Overall, programs that specifically target truancy prevention can be successful. However, individual TPPs differ in their efficacy and all programs should be examined individually when attempting to identify the most efficacious program.

No specific TPP is better than another

Less truancy-specific programs were identified compared to DPPs. The majority of studies included in this section did not refer to truancy specifically, but rather labelled it as poor attendance. Overall, TPPs can improve attendance a small amount, but the effects might not justify the effort and cost associated with TPP delivery ([Appendix 4](#)). Each of the following TPPs have been examined by only one study. This could suggest that programs focusing on reducing truancy or poor attendance are less researched than those specifically targeting dropout.

Diplomas Now is a program that involves reforming the school environment to change the academic experiences of students at risk of disengagement (e.g. poor attendance and behaviour)(Corrin et al., 2016). The program comprises four pillars: Developing teams of teachers and small learning communities, professional development to support supportive curricula and instruction, student supports that are tiered and a can-do culture and school climate (Corrin et al., 2016). Corrin et al. (2016) examined the efficacy of this program at reducing early indicators of disengagement[13], attendance and suspensions in 62 USA high schools. The authors found that Year 6 and Year 9 students in the Diplomas Now program experienced significantly less early warning indicators; however, this effect was lost when the indicators were changed to needing better than 90% attendance, as opposed to 85% (Corrin et al., 2016). Overall, an improvement in attendance, course passing and behaviour was found for Year 6 and Year 9 students who both received, and did not receive, the Diplomas Now program (Corrin et al., 2016). Thus, this large cluster randomized controlled trial demonstrated that Diploma's Now might be efficacious at reducing early indicators of disengagement provided the attendance criterion is better than 85% attendance, as opposed to better than 90% attendance. This program runs

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[13] Students have better than 85% attendance, fewer than 3 days suspended or expelled and passing English/Math

over several years and involves a large amount of human resources. Thus, cost-effectiveness studies are needed to support a decision to implement this program locally.

The Early Truancy Prevention Program (ETPP) is designed to give teachers the skills and autonomy to work with parents to ensure their child's school attendance (Cook et al., 2017). The program includes home visits where the teacher engages parents in learning effective communication strategies (Cook et al., 2017). Teachers are also trained to identify students with attendance problems and target interventions to those who are deemed high-risk for poor attendance (Cook et al., 2017). Thus, the focus of this intervention is mostly on the teachers and parents, rather than the students. A quasi-experimental study examined the efficacy of the year-long ETPP program at reducing absenteeism in 5 high-poverty USA elementary schools (21 classrooms received ETPP, 20 received usual class)(Cook et al., 2017). The prevalence of frequent absences (6 or more days per year) was reduced in the classrooms who received ETPP compared to the control classrooms; however, the classrooms who received ETPP experienced greater 0-4 day absences compared to the control classrooms (Cook et al., 2017). Overall, absences in the classrooms who received ETPP were approximately 10% lower compared to the control classrooms. Thus, based on this study, ETPP programs do not have a significant enough effect to justify its use.

The Early Warning Intervention and Monitoring System (EWIMS) aims to guide schools to deliver seven steps to identify[14] and monitor students at risk of not graduating high school (Faria et al., 2017). The seven steps include:

1. Establish roles and responsibilities of students, schools, parents and coordinators;
2. Use the early warning data tool;
3. Review the data obtained using the tool;
4. Interpret the data;
5. Assign and provide appropriate interventions;
6. Monitor students participating in interventions; and
7. Evaluate and refine the early warning system process.

Faria et al. (2017) used a cluster randomized controlled trial design to evaluate the efficacy of a 14-month EWIMs program at reducing course failure, chronic absence and suspensions in 73 USA high schools. Thirty-seven schools implemented EWIMS (n=18,634 students) and 36 continued usual practice (n=19,037 students). The authors reported that EWIMs significantly reduced course failure and chronic absence, but had no effect on reducing suspensions. However, the improvements in course failure and chronic absence were small. Chronic absence was only 4% less in the EWIMs group compared to the control schools. Similarly, course failure was only 5% less in the EWIMs group compared to the control schools. Suspensions reduced by 9% in both EWIMs and control schools; thus, there was no effect of EWIMs on suspensions. The authors reported that poor implementation of EWIMS could have contributed to the small outcomes. Furthermore, they suggested using predictors of disengagement rather than indicators to identify at-risk students might improve the results in future studies. As for the Diplomas Now program, although small effects were seen, the cost of delivering the program might not justify the outcomes. A cost-effectiveness analysis is needed before using EWIMs in the future.

The Learning for Life[15] program is an early intervention program that aims to engage the student, school, family and community by providing financial support, access to appropriate support programs and fostering close relationships between students and program coordinators (The Smith Family, 2018). The Smith Family undertook longitudinal analysis of program participants' data in order to explore impacts on attendance and school completion. The authors found that, consistent with national data, school attendance declined throughout high school (from 90.7% attendance in Year 6 to 84.3%

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[14] Indicators used to identify disengagement: chronic absence (missed ≥10% instructional time), course performance (e.g. courses failed), behavioural problems (e.g. ≥1 suspension) and 'off-track' (failed ≥2 semester long courses)
[15] https://www.thesmithfamily.com.au/programs/learning-for-life

attendance in Year 10). However, the number of students in the program graduating Year 12 increased from 59.6% in 2010-12 to 68.2% in 2014-16. These improvements in graduation rates are not compared to a control or comparison group or another intervention and so it is not possible to draw strong conclusions about effectiveness. That said, the report authors suggest that 'improvements in attendance and achievement are possible and increase the likelihood of students completing school and being in work or study post-school' (ibid.: 1).

4.4 Dropout prevention guidelines

Dropout prevention guidelines encourage a multifaceted approach

Three guidelines were identified that included recommendations specific to dropout prevention (Balfanz et al., 2009; Dynarski et al., 2008; Rumberger et al., 2017) but no other measures of disengagement. All guidelines recommended monitoring students for signs of being at-risk of disengagement in terms of:

1. attendance;
2. behaviour; and
3. academic or course performance.

Intervention approaches were suggested for students who are identified as at-risk. Recommended interventions to prevent further disengagement were multifaceted and involved delivering social, behavioural and academic-based programs that focused on progression towards a career or university degree upon graduation. Further, these programs should be tailored to the student (e.g. tiered) and delivered to small groups of similar students using the same or similar teachers over time to foster a sense of belonging and support ongoing monitoring. Recommended programs were often referred to as being school-based, but community-based programs were also recommended provided they are appropriate for the individual student. Respectful relationship development between students and adults was also recommended. These recommendations should be used as an overall guide to what a recommended DPP program should include.

Table 2 Recommendations from Dropout Prevention Guidelines

Citation	Topic for guidance	Key recommendations	Summary

Balfanz et al., 2009	Preventing and managing dropout in the USA.	• Schools should monitor how many students:
		  - Miss one or more months of school in K-3;
		  - Begin third grade with poor reading skills; and
		  - Experience serious behavioural problems in K-3.
		
		• During the middle grades and first 2 years of high school, schools should monitor attendance, behaviour and course performance using an early warning system.
		
		• Schools need to respond to students identified using the system with school-wide dropout prevention strategies and targeted supports to be delivered to small groups of students, all of which need additional support.
		
		• When these approaches do not work, more intensive and case-managed approaches are needed. This response needs to be tiered so the student receives the most appropriate intervention for them.
			Schools should use an early warning system that monitors attendance, behaviour and course performance to identify students at risk of disengagement.
			
			Students identified using the system should receive targeted interventions that are tailored to their needs.

Dynarski et al., 2008	Dropout prevention	• Use data systems that can identify students at risk of dropping out; • Adult advocates should be assigned to students at risk of dropping out; • Students should be provided academic support to improve performance; • Deliver programs aimed at improving classroom behaviour and social skills; • Personalize the classroom/learning environment to foster belonging; and • Provide the skills and learning necessary to engage students and support them to graduate.	Both targeted and school-level interventions are important to prevent dropout. Students should receive academic and mentoring support. Improving behaviour and social skills, as well as engaging students in learning that will promote graduation, in a personalized environment is necessary to prevent dropout.
Rumberger et al., 2017	Dropout prevention (secondary school)	• Monitor students for attendance, behaviour and academic problems and intervene if present; • Provide individualized, intensive support to students who have been identified as at-risk; • Provide one person to be the student's advocate;	Student attendance, behaviour and academic problems should be monitored over time. Tailored support should be provided to at-risk students that includes small groups of similar students with similar teachers teaching curricula that are focused on career or university

		• Provide a variety of support options/programs; • Support advocates with appropriate professional development; • Engage students by providing programs that connect school work with university or career success, improving students' ability to manage challenges; • Ensure curricula has a career/university focus; • Use programs that help students to build supportive relationships and manage challenges; • Target interventions to students who are disengaged; • Create small groups of at-risk students across single or multiple grades that facilitate support and monitoring of progress; • Groups of teachers should share the same students; and • Provide time for a lot of support and monitoring.	outcomes. Each at-risk student should have their own advocate who receives ongoing training.

4.5 Summary

The efficacy of DPPs and TPPs on preventing disengagement

- DPPs can successfully reduce dropout, absenteeism and poor attendance. TPPs can improve attendance; however, outcomes were usually small and unlikely to justify the cost of running the program.

- The program does not need to be run over a long period of time or need a large number of contacts between program coordinators and schools to be successful. Programs that use several components or strategies that are tailored to the student can be more successful than simpler programs that use few components or have narrow foci (e.g. focus on dropout but not truancy).

Specific DPPs and TPPs that show most promise for preventing disengagement

- Check and Connect, Career Academies and mentoring all had high level review evidence that suggested that these programs can reduce one or more of dropout, poor attendance and poor graduation rates.

- TPPs are under-researched. Despite no specific TPP appearing better than the others, TPPs that are run within the school (e.g. alternative education programs) as opposed to being removed from the school (e.g. alternative schools) show more promise at reducing truancy.

Guideline recommendations for reducing dropout

- Early identification of students at-risk of dropout should be completed by constantly monitoring attendance, behaviour and course performance.

- DPPs should include several strategies/foci. For example, DPPs should have content that focuses on improving social, behavioural and academic-based skills with the ultimate goal of preparing students for work or university (whichever is important to the student). The DPPs should have small groups of students that are grouped based on the difficulties they are having and the goals they want to achieve. Finally, DPPs should be led by trained and consistent teaching staff who provide ongoing monitoring and support.

Overall summary

- Dropout prevention programs can successfully improve both dropout and truancy.
- Check and Connect, Career Academies and mentoring showed the most promise for preventing disengagement.
- The duration of the program might not be as important as the content. The program should use several strategies, be tailored to the student's needs, be delivered in small groups and have a focus on future goals that are valued by the student (e.g. university or work).

5 Conclusions

This section draws together the key findings emerging from the preceding sections, and considers their implications for schools and school systems.

5.1 Key findings

Predictors of dropout

- There is a strong research base on dropout predictors, but there are more studies that have been undertaken in the US than in Australia.

- Two student-level predictors of dropout were prominent in the literature: educational performance (e.g. test scores) and student behaviour (e.g. attendance). Demographic predictors (e.g. gender) and attitudinal predictors (e.g. educational expectations) are also important factors contributing to dropout.

- Two family-level predictors were prominent in the literature: the socio-economic status of the family and the amount of educational support and encouragement provided to the student by parents.

- School-level predictors (e.g. school type, school resources) are not as influential as student or family-level predictors.

- Predictors based on longitudinal models have been shown to be the most accurate, but cross-sectional data and multiple indicators are also effective.

Use of data to identify disengagement risk

- There is limited research on how schools and teachers use data to identify students at risk of disengagement, particularly in Australia.

- Existing quantitative data and qualitative data can be used to identify students at risk of disengagement. However, time to collect such data, and limited access to it after it is collected, can be barriers.

- When collecting data on disengagement, it is important to collect data over time on *all* students and to focus on key disengagement indicators (e.g. attendance, behaviour and achievement).

- Studies suggest that identifying students at risk can be enhanced by the inclusion of qualitative and subjective data collected by teachers and school staff. Such additional data can provide insights into students' affective and cognitive dispositions through understanding their peer relationships and family backgrounds.

- Schools collect their own data but can also share and use data in a collaborative manner with local agencies and government departments. Whilst this sharing of data is useful, schools do need to modify local agency data to develop their own localised 'at risk' indicators.

Early interventions to prevent disengagement

- The majority of research examining the efficacy of dropout prevention programs (DPPs) and truancy prevention programs (TPPs) emerges from the USA, and there is more research examining DPPs than TPPs.

- DPPs can successfully reduce dropout, and programs that include more components (e.g. academic strategies and behavioural strategies) are likely to be more successful than those that contain less components.

- Certain specific DPPs (Check and Connect, Career Academies and mentoring) all had high level review evidence indicating that these programs can reduce one or more of dropout, poor attendance and poor graduation rates.

- The duration of DPPs might not be as important as the content. The program should use several strategies, be tailored to the student's needs, be delivered in small groups and have a focus on future goals that are valued by the student (e.g. university or work).

- TPPs can improve attendance; however, outcomes were usually small and unlikely to justify the cost of running the program. Programs that are run within the school (e.g. alternative education programs) as opposed to being removed from the school (e.g. alternative schools) show more promise at reducing truancy.

5.2 Implications

1. This literature review shows that there is an evidence base that could inform schools' and school systems' efforts to identify and intervene with students at risk of disengagement. *This means that evidence-informed practice is a possibility in this area, and efforts should be made to foster stronger connections between research and practice/policy at all levels of Australian jurisdictions.*

2. The current evidence base is better developed in relation to certain topics (e.g. predictors versus data-based identification) and certain locations (e.g. USA versus Australia). *This means that efforts to foster evidence-informed practice in this area in Australia need to be mindful of potential limitations with the evidence and its transferability, and recognise the need for investment in further research on this issue in Australia.*

3. The well-developed research literature on predictors of school dropout highlights the importance of certain student-level (e.g. educational performance, behaviour, and aspirations) and family-level (e.g. socio-economic status, and educational support) factors. *This means that efforts to identify students at risk of disengagement within schools and across systems should focus on combinations of these kinds of factors early in the educational process.*

4. There is some evidence to suggest that it is preferable to use predictors that are based on analysis of trends over time (e.g. longitudinal growth modelling) and multiple non-overlapping indicators (e.g. low attendance *or* poor behaviour, rather than low attendance *and* poor behaviour). *This means that education jurisdictions should seek, where possible, to prioritise the use of multiple non-overlapping indicators and analysis of trends over time.*

5. Emerging research and evaluation on the use of data to identify students at risk of disengagement suggests that jurisdictions can usefully develop early warning systems that monitor all students in order to identify and proactively intervene with those who show early signs of attendance, behaviour or academic problems. *This means that there are international examples that Australian school and system leaders could investigate and draw upon, and early stage evaluation findings that they could consider and use.*

6. The current emerging evidence also suggests that early warning systems need to be: focused on specific key indicators but also flexible to local contexts; based on system-level data but also practitioner expertise and judgement; timely for early prevention but also rigorous for accuracy; targeted to those at most risk but also monitoring of all students; practical and easy to use but also building of new capabilities and cultures; and about early identification but also early intervention. *This means that the development of early warning systems in Australian schools and jurisdictions needs to be carefully designed, effectively implemented and well supported.*

7. Research and evaluation into the efficacy of interventions with students at risk of disengagement shows that dropout prevention programs (e.g. Check and Connect, Career Academies and mentoring) can successfully reduce dropout and improve attendance, and truancy prevention programs (e.g. Diplomas Now, Early Truancy Prevention Program) can improve attendance but tend to have less marked impacts. *This means that the development and implementation of targeted early intervention programs is worth considering in the Australian context but with careful thinking about transferability and evaluation.*

8. The evidence to date indicates that dropout prevention programs are more effective when they: include more components (e.g. social, academic and behavioural), are tailored to student's needs and focus on future goals valued by the student, and are delivered in small groups by trained and consistent staff. Truancy prevention programs are less well researched but it seems that programs that are run within (as opposed to outside of) the school show more promise for reducing truancy. *This means that there are research-informed insights that could provide a starting point for the design, development, implementation and evaluation of early intervention programs in Australian school and school systems.*

Finally, while all of the above points are in some way distinct in terms of how they emerge from the research literature, the key challenge that underpins and unites them is one of connection. How to connect an understanding of early predictors with the thoughtful development of early identification processes that are in turn connected with and informed by targeted and skilfully-implemented early intervention practices. This literature review has shown that the current evidence base can provide some powerful starting points for schools and school systems that are seeking to improve their early identification and intervention practices with students at risk of disengagement.

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7 Appendices

=Appendix 1: Syntax for ERIC Database (EBSCOhost)

Population:

TI(adolescen* OR child* OR educat* OR 'elementary school' OR 'high school' OR 'primary school' OR principal OR school OR 'secondary school' OR teach) OR AB(academi* OR administrat* OR class* OR counsel* OR disadvantage OR emotion* OR family OR 'formative year' OR health OR instruct* OR juvenile OR learn* OR lesson OR parent OR pupil OR scholar* OR social* OR 'socio-economic status' OR student OR superintendent * OR teen* OR tuition OR tutor OR 'young people' OR youth) AND DE ('High School Students' OR 'High School Freshmen' OR 'High School Seniors' OR 'Grade 12' OR 'Primary Education' OR 'Grade 1' OR 'Grade 2' OR 'Grade 3')

Intervention/Approach:

TI(collect* OR data* OR 'data analysis' OR 'data collection' OR 'data culture' OR evidence OR indicat* OR information OR instrument OR measur* OR predict* OR record OR research OR 'standardi?ed test' OR statistic* OR 'early warning system' OR 'early action' OR 'early intervention' OR prevent*) OR AB(analytic* OR assess* OR associat* OR calculate OR catalogue OR categori?e OR diagnos* OR evaluat* OR examin* OR fact* OR figure OR form* OR gather* OR gonski OR guid* OR identif* OR level OR mark* OR NAPLAN OR number OR position OR question* OR rank* OR result OR score OR sign OR summa* OR tool OR 'intermediate strategy' OR preempt* OR psycholog* OR support OR 'targeted intervention') AND DE('Data' OR 'Databases' OR 'Bibliographic Databases' OR 'Online Catalogs' OR 'Metadata' OR 'Personnel Data' OR 'Profiles' OR 'Scores' OR 'Cutting Scores' OR 'Equated Scores' OR 'Grade Equivalent Scores' OR 'Raw Scores' OR 'True Scores' OR 'Weighted Scores' OR 'Statistical Data' OR 'Census Figures' OR 'Educational Indicators' OR 'Employment Statistics' OR 'Norms' OR 'School Statistics' OR 'Social Indicators' OR 'Data Analysis' OR 'Data Collection' OR 'Data Interpretation' OR 'Statistical Analysis' OR 'Trend Analysis' OR 'Data Processing' OR 'Natural Language Processing' OR 'Evidence' OR 'Measurement' OR 'Achievement Rating' OR 'Cognitive Measurement' OR 'Merit Rating' OR 'Predictive Measurement' OR 'Scoring' OR 'Tables (Data)' OR 'Taxonomy' OR 'Early Intervention' OR 'Intervention' OR 'Crisis Intervention' OR 'Early Intervention' OR 'Prereferral Intervention' OR 'Response to Intervention' OR 'School Turnaround' OR 'At Risk Persons' OR 'At Risk Students' OR 'Educational Diagnosis' OR 'Reading Diagnosis' OR 'Prevention' OR 'Accident Prevention' OR 'Crime Prevention' OR 'Dropout Prevention' OR 'Special Needs Students')

Outcome:

TI(attrition OR barrier OR 'behavior?ral disengagement' OR 'cognitive disengagement' OR complet* OR disengage* OR dropout OR 'emotional disengagement' OR facilitat* OR grad* OR truancy) OR AB(ability OR absen* OR accomplish* OR achiev* OR activat* OR aggressi* OR anxi* OR apath* OR appear* OR aptitude OR attend* OR attent* OR attitude OR behavior?r OR belief* OR belong* OR bor* OR capab* OR challeng* OR cogniti* OR communicat* OR commit* OR concentrat* OR connect* OR competen* OR defeat* OR detach* OR determin* OR difficult* OR discipline* OR 'disciplinary action' OR disaffect* OR disconnect* OR dismiss* OR disrupt* OR distract* OR effort* OR emotion* OR enabl* OR engage* OR enthusias* OR estranged OR exclu* OR expect* OR expel* OR expulsion OR fail* OR frustrat* OR happ* OR homework OR hurdle OR improv* OR inclu* OR inspir* OR interest* OR isolat* OR justice OR know* OR late* OR learn* OR 'learning difficult*' OR motivat* OR nonappearance OR nonattendance OR outcome OR outlook OR participat* OR pass* OR passion* OR perform* OR pleasur* OR preoccupied OR progress* OR punctual* OR read* OR relevan* OR ret* OR risk* OR schoolwork OR skill OR

stimulation OR striv* OR struggl* OR stud* OR 'study skills' OR success* OR suspen* OR tard* OR train* OR troubl* OR underachiev* OR undisciplined OR unfocused OR uninterested OR unmanageable OR violen* OR wast* OR withdraw*) AND DE('Learner Engagement' OR 'Learning Motivation' OR 'Self Motivation' OR 'Student Attitudes' OR 'Student Participation')

NOT preschool OR

Appendix 2: Summary of Studies on Predictors of School Dropout

Study	Aim	Location	Sample/datasets	Analysis
Empirical studies of dropout predictors in North America				
Henry et al. (2012)	To examine an early warning index (the school disengagement warning Index) and its relationship with problem behaviour outcomes during adolescence and into young adulthood.	Rochester, US	911 students from the Rochester Youth Development Study (a longitudinal panel study that began in 1988 with 1,000 7th- and 8th-grade students)	Probit regression model
Barry & Reschly (2012)	Longitudinal study to examine predictors of dropout assessed in elementary school	Southeastern school district, US	201 third grade students who were eligible for high school completion in May 2006 or 2007	Predictive discriminant analysis
Parr & Bonitz (2015)	To test a model predicting high school dropout from constructs relating to student demographic background, and school-related beliefs and behaviors.	US	National US sample of 15,753 high school students who were in 10th grade in 2002 and graduated 2 years later (2004)	Structural equation modeling analysis
Franklin & Trouard (2016)	To explore how effective the variables age, poverty, attendance, gender, and test score collected in Grade 6 are, compared to the same variables collected in Grade 8, for predicting dropouts during the high school years for two graduation panels.	Louisiana, US	Grade 7 panel containing 29,554 members (tracked over next 6 years) and a Grade 9 panel with 31,641 members (tracked over next 4 years). Data extracted from the Louisiana state longitudinal data system.	Logistic regression
Robison et al. (2017)	To examine the relative impacts of demographic, school-related, and juvenile justice variables on public school dropout and graduation.	Louisiana, US	596,537 urban students in 1658 schools in Louisiana, USA from August, 1996 through to December, 2012. Data taken from the Louisiana Department of Education Student Information System and the Louisiana Office of Juvenile Justice.	Hierarchical, mixed-effects logistic regression modelling
Wood et al. (2017)	To determine) which student- and school-level predictors were significantly related to the probability of ever dropping out of high school during or after sophomore year	US	National sample of 14,106 students from 684 schools in Grade 10 in 2002 until graduation two years later	Hierarchical generalized linear modelling (HGLM)
Orpinas et al (2018)	To examine the trajectories of students' aggression and study skills from 6th to 12th grade and their association with school dropout.	US	Nationally-normed annual teacher ratings for 620 students from Grade 6 to Grade 12 in northeast Georgia, USA. Data taken from the Healthy Teens Longitudinal Study.	Latent class mixture modelling
Lovelace et al., 2018	To examine whether student engagement surveys have additional predictive value beyond data readily available in school	Southeastern school district, US	10,067 ninth graders in 2007-2008 in a large school district until graduation in 2011	Multi-level logistic regression

	databases			
Fortin et al. (2013)	To identify the main factors associated with dropout and determine how the relationships between these factors predict school dropout at 19 years of age.	Quebec, Canada	Convenience sample of 672 students from age 12/13 to age 19/20 (1996-2007)	Structural equation modeling analysis
Empirical studies of dropout predictors in Australia				
Homel et al. (2012)	To study how disadvantage affects education outcomes, in this instance, Year 12 completion.	Australia	Comparative analysis of data from two datasets for young people born between October 1987 and March 1988, and completed Year 12 in 2006. Samples included 3975 young people from Longitudinal Survey of Australian Youth and 1746 from Youth in Focus survey.	Multivariate analysis
Polidano et al. (2013)	To quantify the relative contribution that a large range of factors related to SES, such as school, home and peer characteristics, makes to the SES school completion gap.	Australia	Linked data from PISA 2003 (12,500 15-year-old students from 321 schools) and the Longitudinal Survey of Australian Youth (c. 10,000 15-year-old students)	Oaxaca–Blinder style decomposition approach
Homel and Ryan (2014)	To determine whether student background factors, such as socioeconomic status (SES) and Indigenous status, only affect educational outcomes via their indirect effect on educational aspirations.	Australia	Analysis of data from Longitudinal Surveys of Australian Youth (LSAY). Samples included 6002 15-year olds from LSAY 2003 and 5760 15 year olds from LSAY 2006.	Multivariate analysis
Marks (2014)	To examine student and school influences on reaching Year 12, the final year of schooling in Victoria, Australia.	Victoria, Australia	Data taken from the population of 70,000 students who were in Year 9 in 2008. Study used a merged longitudinal data set from the Year 9 Australian NAPLAN and the Year 12 VCE.	Logistic regression
Reviews/syntheses of dropout research/predictors internationally				
Rumberger and Lim (2008a)	To review and synthesise the theoretical and empirical literature on predictors of school dropout.	US	203 empirical studies, mainly focused on national level data-sets published during the preceding 25 years	Systematic review
De Witte et al (2013)	To analyse the literature on early school leaving in order to produce an overview of factors that may be most predictive of early school leaving.	International	International research on early school leaving	Critical review
Bowers et al. (2013)	To calculate and compare accuracy (precision, sensitivity and specificity) of dropout predictors.	US/Canada	110 dropout indicators (all student-specific indicators and for school-wide population) derived from 36 empirical studies of high school dropout predictors in US/Canada over 30 years	Relative Operating Characteristic (ROC) Analysis

Appendix 3: Summary of Studies on the Efficacy of DPPs

	Citation	Program/s evaluated	Key findings
Systematic and narrative reviews	Ekstrand et al., 2015	PBIS	'Experiencing problems with schoolwork is by far the most infallible factor for predicting dropout…For a long time research has focused on an isolated factor, describing risk factors leading to failure instead of trying to identify what will prevent the problem and foster students' abilities to succeed in school. Future studies must be multidisciplinary, perhaps longitudinal, focusing on developmental stages related to results in school' [pp. 471-472]
	Freeman et al., 2015	DPPs	'…the current body of empirical research provides little guidance to schools or policy makers with respect to either matching dropout interventions with particular risk factors or subgroups or integrating dropout interventions into a multi-tiered framework that may address student needs more effectively and efficiently' [p. 239] 'Although indications are clearly positive, early identification of risk factors and early intervention as well as systemic school-level interventions appear to be relatively untested recommendations in the empirical literature.' [p. 240]
	ICF International & National Dropout Prevention Center/Network, 2008	Achievement for Latinos through Academic Success Career Academies Check and Connect Communities in Schools DPPs Mentoring	'Dropout prevention is a complicated endeavour and must involve a wide range of services to tackle a wide range of problems. There are multiple pathways to dropping out of school, and therefore, any dropout prevention program should have a multi-faceted strategy to serve a wide range of students who are at-risk of dropping out.' [p. ES-1]
	Klima et al., 2009	Career Academies Mentoring	'When programs are divided based on their central focus or modality, alternative educational programs (e.g., schools-within schools) and mentoring programs are found to be effective.' [p. 1] ☐Specifically, Career Academies—an alternative program model that offers a strong career and technical focus—positively impact all three outcomes [dropout, achievement and presence at school], as well as high school graduation.' [p. 1] 'Alternative schools—separate buildings with specialized academic and other services for at-risk students—have a small *negative* effect on dropping out: more at-risk students drop out of alternative schools than other educational programs.' [p. 1]
	Steinka-Fry et al., 2013	DPPs	'The results of our meta-analyses indicated that the prevention and intervention programs had overall beneficial effects on pregnant and parenting adolescents' school dropout and enrolment outcomes.' [p. 384]

	Sullivan et al., 2016	Check and Connect	'…surprisingly, our review identified only one study that systematically examined a dropout prevention program for students with ED…Check & Connect did not show a significant effect on dropout, but the intervention reduced mobility and truancy, both risk factors of dropout.' [p. 256]
	Tanner-Smith et al., 2013	DPPs	'…dropout prevention programs may be more effective in reducing absenteeism in younger students before they establish patterns of chronic absenteeism and truancy.' [p. 477] 'Dropout prevention programs that focused explicitly on providing supplemental academic training or vocational or employment skills did tend to show overall positive effects in the RCT studies' [p. 477]
	What Works Clearinghouse, 2008	Accelerated Middle Schools Achievement for Latinos through Academic Success Career Academies Check and Connect	'In looking at the three outcome domains for the 16 interventions, four interventions had positive or potentially positive effects in two domains: Accelerated Middle Schools had potentially positive effects on staying in school and positive effects on progressing in school; Achievement for Latinos through Academic Success had potentially positive effects on staying in school and on progressing in school; Career Academies had potentially positive effects on staying in school and on progressing in school; and Check & Connect had positive effects on staying in school and potentially positive effects on progressing in school' [p. 1]
	Wilson et al., 2011	DPPs Mentoring	'Although most of the general programs produced positive effects on dropout (75% of the effect sizes were positive), there was considerable variability across the programs in overall effectiveness.' [p. 49] 'Overall, participant demographics had minimal influence on dropout program effectiveness. The gender and racial composition of samples had no significant influence on general programs' effectiveness' [p. 50]
Quasi-experimental studies	Briones et al., 2015	DPPs	'There are many contributing factors in determining whether an urban high school with four or more intervention and prevention programs employed in its school which is designed to increase the graduation rate and decrease the dropout rate is more likely to obtain higher graduation rates and lower dropout rates than schools with less than four intervention and prevention programs. Some contributing factors may include the socioeconomic status of the students' family, the parents' marital status, the student's school discipline and legal record and whether the student is a teenage parent and the student has been retained.' [p. 8]
	Walsh et al., 2015	City Connects	'The results from this study provide evidence that intervening in the elementary school years can make a difference. We hypothesize that City Connects may be able to positively

			affect [dropping out of high school] because it addresses both strengths and needs of every student not only in academics, but in behavioral/social/emotional growth, health, and family domains, and connects students to the particular supports they need during critical periods of development' [p. B-4]

Appendix 4: Summary of Studies on the Efficacy of TPPs

	Citation	Program/s evaluated	Key findings
Cluster RCTs	Corrin et al., 2016	Diplomas Now	'At the high school level, Diplomas Now was more successful at keeping students who had better than 90 percent attendance, no suspensions or expulsions, and no core course failures in eighth grade above those thresholds in ninth grade than getting other students across them. ' [p. 37]
	Faria et al., 2017	Early Warning Intervention and Monitoring System (EWIMS)	'At the school level, EWIMS did not have a detectable impact on school data culture, that is, the ways in which schools use data to make decisions and identify students in need of additional support.' [p. ii] 'In nearly all participating schools, overall implementation of the EWIMS seven-step process was low, and implementation was challenging. Nevertheless, EWIMS schools were more likely than control schools to report using an early warning system and having a dedicated team to identify and support at-risk students, but EWIMS schools did not differ from control schools in the frequency of data review or the number and type of interventions offered.' [p. ii]
Systematic and narrative reviews	Ekstrand et al., 2015	TPPs Check and Connect	'Truancy cannot be reduced by law and order…and where mild punishment does not work, neither does harsher discipline…Penalties rather maintain or increase absenteeism. Children avoid punishment and thereby their teachers, the school buildings, and the schoolwork. Attendance groups and rewarding children who choose school are far more effective measures…' [p. 464] '…this review unambiguously demonstrates a need for a shift in perspective in order to prevent school absence and encourage school attendance. There exists a need to divert attention from the characteristics of individuals and truancy to study what success in school requires, drawing out children's strengths rather than weaknesses; success stems from a positive school climate, bonding with adults, and the development of core competencies.' [p. 473]
	Klima et al., 2009	TPPs	'It has been suggested that when students perceive transfer to an alternative schoolas punishment, rather than a choice to attend a more appropriate educational environment, their academic motivation may be hurt…Lack of motivation may, in turn, impact the decision to remain in school.' [p. 8]
Quasi-experimental	Cook et al., 2017	Early Truancy Prevention Program (ETPP)	'The intervention components included in the Early Truancy Prevention Program model are feasible for schools to implement and together constitute a promising way to improve student attendance in the primary grades.' [p. 268] 'While this role was a natural extension of the typically close relationship between primary-grade students and their teachers, there was some extra

			burden on the teachers' time.' [p. 268]
	The Smith Family, 2018	Learning for Life	'Attendance and achievement are early indicators of students who are likely to have poor longer-term outcomes, as they help predict school completion and engagement post-school in work or further study.' [p. 1] 'There is a significant opportunity to improve the educational performance of Australian school students, particularly those from disadvantaged backgrounds. Key to improving their educational outcomes are: Tracking students' individual progress; using educational data to identify, as early as possible, which students need additional support; and targeting support to meet the educational challenges and circumstances of individual students.' [p. 1-2]

Appendix 5: List of indicators for identifying young people at risk of becoming NEET

– Filmer-Sankey et al. (2012: 13)

'Hard' indicators (statistical or factual):	Other personal indicators, including 'soft' indicators
General indicators:	Personal and family circumstances:
• gender, ethnicity, and English as an additional language (EAL)	• family relationships
• attainment at key stages 1 to 4	• family breakup
• attendance and exclusion rates	• parental employment
• eligibility for free school meals (FSM)	• family culture
• special educational needs (SEN)	• having enough money
• looked-after children (LAC)	• drug and alcohol misuse
• traveller	• teenage parent/pregnancy
• asylum seeker/refugee	• young offender
• whether the young person has a CAF (Common Assessment Framework)	• parents in prison
• whether the young person has been referred to professional agencies	• whether the young person has moved schools
• medical conditions (if it affects learning/attendance).	• bereavement
Local and school indicators:	• young carer
• Geographical location (rural/urban)	• on a Child Protection Plan
• Availability and cost of transport	• mental health issues
• Structural arrangements for 16–19 provision	• domestic violence.
• Quality and extent of 16–19 provision, and availability of information on post-16 options	Attitudinal and aspirational factors:
• Courses on offer, access to courses, quality of careers information, advice and guidance, etc.	• difficult social relationships/happiness with relationships
• lack of involvement in school activities, clubs, enrichment and work experience opportunities	• lack of involvement in school activities, clubs, enrichment and work experience opportunities
• lack of active and supportive parental involvement	• lack of active and supportive parental involvement
• lack of engagement with careers advice or interest in post-16 opportunities	• lack of engagement with careers advice or interest in post-16 opportunities
• not participating in lessons	• not participating in lessons
• low confidence and self-esteem	• low confidence and self-esteem
• knowledge of own strengths and weaknesses	• knowledge of own strengths and weaknesses
	• happiness at school
	• mental resilience
	• 'stickability' to a task
	• aspirations
	• how important work is considered to be
	• lack of direction

Appendix 6: Checklist of indicators for identifying reasons why young people may be at risk of disengaging

– Southcott et al. (2013: 19-20)

Theme 1: Factors associated with structure/environment

• Gender

• Ethnicity

• Eligibility for free school meals (FSM)

• Traveller

• Asylum seeker/refugee

• Geographical location (e.g. rural/urban)

• Local unemployment rate/deprivation indices

Theme 2: Factors associated with level of attainment/educational needs

• Attainment at Key Stage 1 &/or 2

• Attainment at Key Stage 3 &/or 4

• Attendance and exclusion rates

• English as an additional language (EAL)

• Special educational needs (SEN)

Theme 3: Factors associated with local education services

• Does not have access to and/or cannot afford transport

• Does not have access to quality local 16-19 provision

• Does not have access to a range of appropriate courses for 16-19 year olds

• Does not have access to independent and impartial careers information, advice and guidance (IAG)

Theme 4: Factors associated with personal/family circumstances

• Has social care involvement (e.g. is classed as a looked-after child (LAC), has a common assessment framework (CAF) or is a young carer on a child protection plan)

• Has been referred to other professional agencies

• Has suffered poor family relationships/breakup

• Has unemployed parents

• Has parents in prison

• Does not have a positive role model in the family

• Lives amongst domestic violence

• Appears to be living in poverty or shows signs of deprivation

• Has suffered a bereavement

• Has medical condition(s) which impact on school life

• Has misused or is misusing drugs and/or alcohol

• Is a teenage parent/pregnant

• Is a young offender

• Has moved schools

• Has difficult social relationships (e.g. gang culture or peer pressure)

Theme 5: Factors associated with attitude/aspirations

• Has a lack of involvement in school activities, clubs, enrichment and work experience opportunities

• Has a lack of active and supportive parental involvement

• Is not participating in lessons

• Has low confidence and self-esteem

• Is unhappy at school

• Lacks mental resilience

• Lacks 'stickability' to a task

• Does not understand how important work is considered to be

• Has a lack of engagement with careers advice or interest in post-16 opportunities

• Has low, unrealistic or no aspirations

• Lacks direction

Theme 6: Factors associated with progression routes

• Does not understand own strengths and weaknesses and how that informs progression

• Does not understand progression routes

• Is not satisfied with available progression routes

Appendix 7: Criteria for selection of young people identified as potentially suitable for inclusion in a Hands on Learning class

Turnbull (2013: 7)

Issue Category	Typical Presenting Symptoms	Identify Nature of Issue	Note Appropriate Intervention/s	
Academic	Difficulty with completing learning tasks. Avoidance so as to conceal an inability to cope with the academic program.	• Literacy/numeracy assessment • Cognitive assessment/disability • Speech/Language • Student Engagement Assessment	Internal	☐ Literacy/Numeracy support via applied learning plus 1:1 ☐ Hand On Learning ☐ Individual Learning Plan modifying educational program to meet needs ☐ Home work programs / cross age tutoring ☐ PSD Application
			External	☐ Lewis and Lewis referral ☐ SSSO allied health assessment ☐ Respite Service referral for students with intellectual disability ☐ Register with Disability Client Services ☐ Referral to Centrelink for Disability Support benefit
Peer	Engages in behaviours that alienate them. Socially isolated and unable to sustain friendships. Dysregulated and impulsive.	• Bullying • Student Engagement Assessment • Mental Health (Depression, anxiety, self harm, eating disorders) • Autism/Aspergers • Risk assessment to determine behaviours that expose young person to harm associated with substance misuse/sexual activity	Internal	☐ Social skills / Personal Development support and education ☐ Hands On Learning ☐ Referral to SSSO ☐ Social Emotional PSD ☐ Restorative Practise ☐ Behaviour modification programs; reward programs ☐ Leadership Activities ☐ Behaviour management plan to support self management ☐ Logical consequences connected to school discipline policy
			External	☐ Referral to GP ☐ For mental health plan ☐ Referral to private clinician for counselling ☐ Paediatric review for developmental assessment ☐ Referral to STU ☐ Referral to camping and school holiday programs ☐ Referral to CAMHS for students in the clinical range of distress ☐ Referral to drug and alcohol service for students engaging in self medicating use ☐ Referral to mentoring programs in the community
Family	Ongoing issues related to poverty. Family has high levels of needs due to mental health/disability/homelessness. Family requires support with parenting.	• Communication/interview with family to determine level of need. • Domestic Violence • Substance misuse • Gambling • Grief and Loss • Family Break down	Internal	☐ State School Relief support with Uniform ☐ EMA assistance with excursions for students to participate in education program ☐ Social skills / Personal Development support and education ☐ Referral to SSSO ☐ Social Emotional PSD
			External	☐ Referral to Centrelink for family support benefits ☐ Child First Family support Referral ☐ Emergency relief ☐ Community support services referral for financial and/or case management family assistance ☐ Community Health Programs ☐ Possible referral to DHS ☐ Respite services ☐ Parent Support Group ☐ Parent Information/education programs